Nokia Customer Care

SERVICE MANUAL

[NMP Part No. 9239311 (Issue 1)]

RM-72

Nokia 6230i

Mobile Terminal

COMPANY CONFIDENTIAL

Issue 1 03/05
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Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
Issue 1	March 2005	Johanna Bryman	

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IMPORTANT

This document is intended for use by qualified service personnel only.

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Warnings and Cautions

Please refer to the *product's* user guide for instructions relating to operation, care and maintenance including important safety information. Note also the following:

Warnings:

1. IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.

2. THE *product* MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES EG PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.

3. OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.

Cautions:

1. Servicing and alignment must be undertaken by qualified personnel only.
2. Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
3. Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
4. Use only approved components as specified in the parts list.
5. Ensure all components, modules screws and insulators are correctly re-fitted after servicing and alignment. Ensure all cables and wires are repositioned correctly.

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For your safety

QUALIFIED SERVICE
Only qualified personnel may install or repair phone equipment.

ACCESSORIES AND BATTERIES
Use only approved accessories and batteries. Do not connect incompatible products.

CONNECTING TO OTHER DEVICES
When connecting to any other device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

ESD protection

Nokia requires that *product* service points have sufficient ESD protection (against static electricity) when servicing *products*.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

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Battery information

Note that a new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMh batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short- circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

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Care and maintenance

The product is a product of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

Keep the phone and all its parts and accessories out of the reach of small children.

Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.

Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.

Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.

Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.

Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.

Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.

Do not paint the phone. Paint can clog the moving parts and prevent proper operation.

Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

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Company Policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing.

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Latest Amendment Number (if applicable)

Page(s) and/or Figure(s) in error

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Nokia Customer Care

1 - General Information

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RM-72 Product Selection

The RM-72 (Nokia 6230i) is a new triple band transceiver family. RM-72 is designed for the GSM900 (including EGSM), GSM1800, DCS1900 and PCS 1900 networks.

Name	Type Code	Material Code / Module type	Module code
Basic transceiver Nokia 6230i	RM-72	0519797	
Main system board		1MAA	0202552
UI board Module		EZ4D	0275785
Mechanical assy parts			0263773
SW flash file			8472629

Table 1: RM-72 product and modules

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Accessories List

Batteries
BL-5C Battery 900mAh Li-ion
Chargers
ACP-12 TRAVEL CHARGER
AC-1 RETRACTABLE CHARGER
Audio
HDA-10 TTY Adapter
HDB-4 Boom Headset
HDS-3 Stereo headset
HDW-3 Wireless headset
HS-11W Wireless headset
HS-13W Wireless image headset
HS-21 Wireless clip-on headset
HS-4W Wireless boom headset
HS-3 Fashion stereo headset
HS-5 Headset
HS-6 Display headset
HS-8 Nokia activity headset
LPS-4 Inductive loopset
MD-1 Music stand

Car Accessories
AXF-15S Antenna coupler
BHF-3 Headrest handsfree
CK-10 Car kit
CK-1W Wireless car kit
CK-7W Advanced car kit
HF-3 Plig-in car handsfree
LCH-12 Mobile charger

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MBC-15S Mobile holder
N616 Nokia 616 car kit
Image
PT-6 Remote camera
PD-1 Image album
Other
DCV-14 Connectivity cable
DKU-2 Connectivity cable
MU-1 64MB MMC
Carrying strap

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Technical Specifications

■ General specifications of transceiver RM-72

Unit	Dimensions (mm) (L x W x T)	Weight (g)	Volume (cm^3)
Transceiver with BL-5C 900mAh Li-ion battery pack	103 x 44 x 20	99	76

Parameter	Unit
Cellular System	GSM900, EGSM900, GSM1800 and PCS1900
RX Frequency Band	EGSM: 925 - 935 MHz GSM900: 935 - 960 MHz GSM1800: 1805 - 1880 MHz PCS1900: 1930 - 1990 MHz
TX Frequency Band	EGSM: 880 - 890 MHz GSM900: 890 - 915 MHz GSM1800: 1710 - 1785 MHz PCS1900: 1850 - 1910 MHz
Output Power	GMSK EGSM900: +5…+33 dBm / 3.2mW…2W GSM1800: +0…+30 dBm / 1.0mW…1W PCS1900: +0…+30 dBm / 1.0mW…1W 8-PSK EGSM900: +5…+27 dBm / 3.2mW…2W GSM1800: +0…+26 dBm / 1.0mW…1W PCS1900: +0…+26dBm 1.0mW…1W
Number of RF Channels	EGSM: 124 GSM1800: 374 PCS1900: 300
Channel Spacing	200 kHz
Number of TX Power Levels	GSM900 *: 15 GSM1800: 16 PCS1900: 16

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■ Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	-10 ^{o}C ... +55 ^{o}C	Specifications fulfilled
Reduced performance	+55 ^{o}C ... +65 ^{o}C	Operational only for short periods
Intermittent operation	-20 ^{o}C ... -10 ^{o}C and +65 ^{o}C ... +85 ^{o}C	Operation not guaranteed but an attempt to operate will not damage the phone
No operation	-40 ^{o}C ... -20 ^{o}C	Operation not possible but an attempt to operate will not damage the phone
No operation or storage	< -40 ^{o}C and > +85 ^{o}C	No storage; an operation attempt may cause permanent damage
Charging allowed	-25 ^{o}C ... +60 ^{o}C	
Long term storage conditions	0 ^{o}C ... +40 ^{o}C	

■ Humidity

Relative humidity range is 5...95%.

The BB module is not protected against water. Condensed or splashed water might cause malfunction. Any submerge of the phone will cause permanent damage. Long-term high humidity, with condensation, will cause permanent damage because of corrosion.

The baseband module complies with the SPR4 operating conditions.

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■ Battery endurance

Nokia measurements of the operational times in GSM 900/1800 are:

Talk time with battery BL-5C	
Talk time variations	Up to 3-5 hours
Integrated Handsfree (IHF) talk time	Up to 130 min
Stand-by time	Up to 150-300 h
Radio + HDS-3	Up to 20 h

Variation in operation times will occur depending on SIM card, network settings and usage. When testing MS battery life, it is initially assumed that the MS is a single band MS operating with the GSM FR speech codec, GPRS/EGPRS is not active.

■ Electrical characteristics

Table 2: Absolute Maximum Ratings

Parameter	Min.	Typical	Max.	Unit
Battery Voltage	3.145	3.7	4.23	V
Charger Input Voltage	0		16	V
Charging Current	0		0.85	A

Table 3: Current Consumption

Condition	Min.	Typical	Max.	Unit
Call (MoU) EGSM 900 DCS 1800 PCS 1900		 208 188 168		 mA
Idle (MoU)		2.72		mA
Power off	150		250	mA

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■ Normal and extreme voltages

Following voltages are assumed as normal and extreme voltages for used battery:

Table 4: Normal and extreme voltages

Voltage	Voltage [V]	Condition
General Conditions		
Nominal voltage	3,700	
Lower extreme voltage	3,145	1
Higher extreme voltage (fast charging)	4,230	2
HW Shutdown Voltages		
Vmstr+	2,1 ± 0,1	Off to on
Vmstr-	1,9 ± 0,1	On to off
SW Shutdown Voltages		
Sw shutdown	3,1	In call
Sw shutdown	3,2	In idle
Min Operating Voltage		
Vcoff+	3,1 ± 0,1	Off to on
Vcoff-	2,8 ± 0,1	On to off

[1] ADC settings in the SW might shutdown the phone above this value.
[2] During fast charging of an empty battery, the voltage might exceed this value. Voltages between 4.20 and 4.60 might appear for a short while.

■ Vibration

The baseband module complies with the SPR4 operating conditions.

■ ESD strength

Standard for electrostatic discharge is IEC 61000-4-2 and level 4 requirements are fulfilled.

The baseband module complies with the SPR4 operating conditions.

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■ Transceiver features

Main HW/features include:

- EDGE MSC 10
- GPRS MSC 10
- Active TFT color display 208x208 - 65 536 colors
- Integrated Camera - 1280x1024 (1.3Mpixel)
- MMC Multimedia card support
- Douglas style UI with 5-way navigation
- Integrated Handsfree IHF speaker
- Digital camcorder - record and playback
- Streaming video incl. AMR (audio), WB-AR and AAC
- Bluetooth - incl. SIM Access Profile (SAP), SyncML, file transfer profiles
- MMS OMA 1.2
- Java MIDP 2.0 with BT API
- XHTML over TCP/IP
- Presence/Dynamic phone book - Wireless Village
- E-Mail client (Java based)
- Digital music player for MP3/AAC/MP3 music formats
- FM Stereo Radio
- MIDI support - 64 polyphonic
- Push2Talk
- FM stereo radio
- USB interface to PC

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2 - Parts Lists and Component Layout

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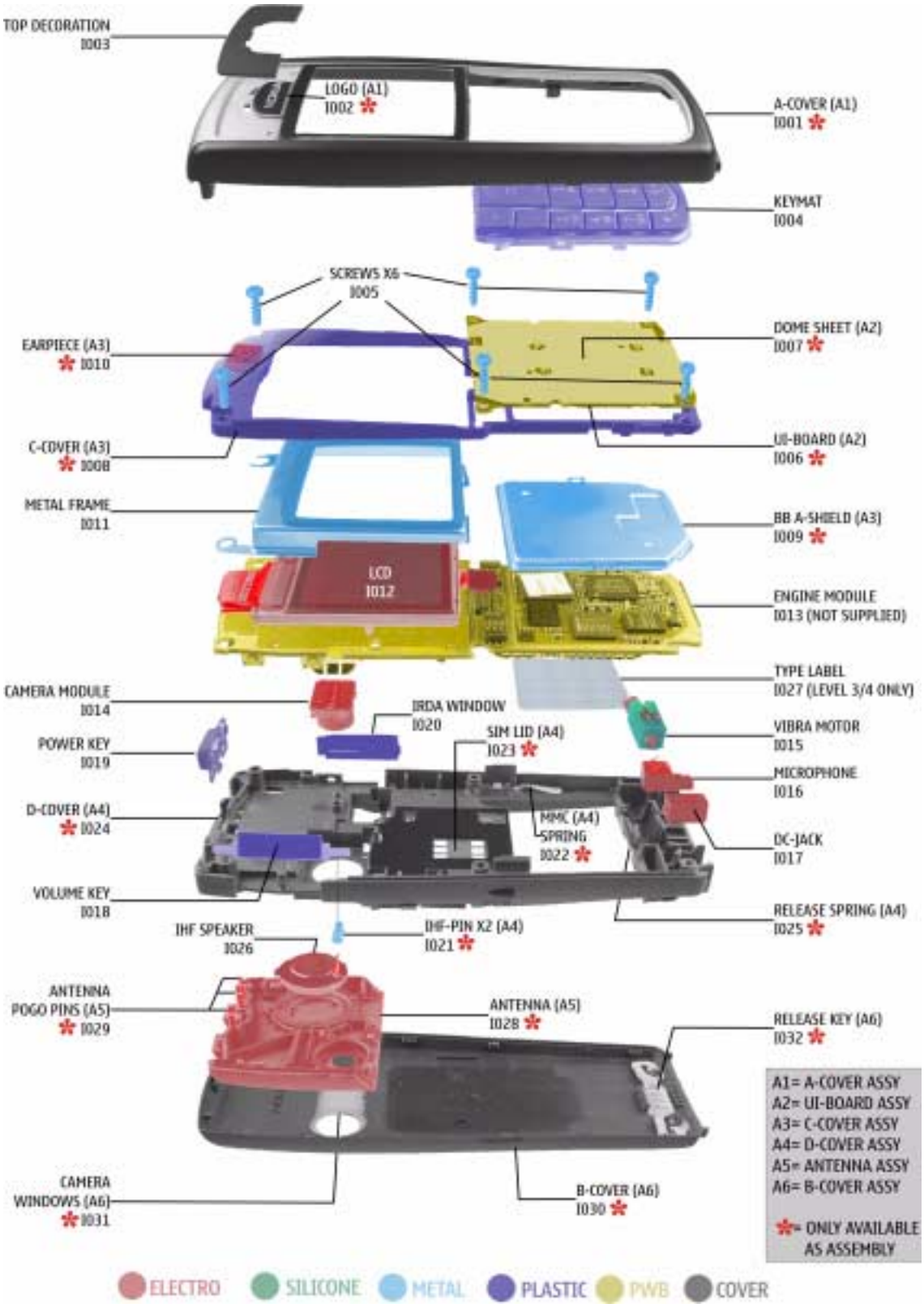
Exploded View of Nokia 6230i, RM-72



For the individual parts, refer to the next page.

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Parts lists

The parts lists are subject to change. Please refer to the Service bulletins for the latest information.

Mechanical parts

ITEM/ CIRCUIT REF.	QTY	PART NAME
	1	A-COVER ASSY
I001	1	A-COVER
I002	1	LOGO
I003	1	TOP DECORATION
I004	1	KEYMAT
I005	6	SCREWS 1.8X7.4 T6 PLUS
	1	UI-BOARD ASSY
I006	1	UI-BOARD
I007	1	DOMESHEET
	1	C-COVER ASSY
I008	1	C-COVER
I009	1	BB A-SHIELD INCL. GASKET
I010	1	EARPIECE
I011	1	METAL FRAME
I012	1	LCD
I013	1	ENGINE MODULE
I014	1	CAMERA MODULE
I015	1	VIBRA MOTOR
I016	1	MICROPHONE
I017	1	DC-JACK
I018	1	VOLUME KEY
I019	1	POWER KEY
I020	1	IRDA WINDOW
	1	D-Cover ASSY
I021	1	IHF PIN

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ITEM/ CIRCUIT REF.	QTY	PART NAME
I022	1	MMC SPRING
I023	1	SIM LID
I024	1	D-COVER
I025	1	RELEASE SPRING
I026	1	IHF SPEAKER
I027	1	TYPE LABEL
	1	ANTENNA ASSY
I028	1	ANTENNA
I029	1	ANTENNA POGO PINS
	1	B-COVER ASSY
I030	1	B-COVER
I031	1	CAMERA WINDOW
I032	1	RELEASE KEY

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Variant parts

PART NAME	EMEA	APAC	China	LTA
KEYMAT LATIN P2565	●	●		●
KEYMAT HEBREW P2565	●			
KEYMAT ARABIC P2565	●			
KEYMAT GREEK P2565	●			
KEYMAT RUSSIA P2565	●			
KEYMAT STROKE P2565		●	●	
KEYMAT THAI P2565		●		
KEYMAT BOPOMOFO P2565			●	
A-COVER ASSY PAINTED SILVER	●		●	●
A-COVER ASSY BLACK	●	●	●	
A-COVER ASSY WHITE		●	●	
B-COVER ASSY PAINTED SILVER	●		●	●
B-COVER ASSY BLACK	●	●	●	
B-COVER ASSY WHITE		●	●	

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Swap units

PART NAME
RM-72 EURO-C SWAP EUROPE
RM-72 EURO-C SWAP FRANCE
RM-72 EURO-C SWAP SOUTH AFRICA
RM-72 EURO-C SWAP TURKEY
RM-72 EURO-E SWAP RUSSIA
RM-72 EURO-E SWAP UKRAINE

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Component parts, 1maa_02

ITEM	SIDE	XY	PART NAME	TYPE
A100	T	C5	PA SHIELD ASSY DMC05946 HDE12	Shield Assembly
A101	T	J4	RF SHIELD ASSY DMC05948 HDE12	Shield Assembly
A102	T	O6	BB-B SHIELD ASSY DMC05950 HDE12	Shield Assembly
A103	T	I7	VCO-SHIELD DMD10246 HDE12	Shield
B200	B	S4	CRYSTAL 32.768KHZ+-20PPM 12.5PF	Crystal
C100	T	F3	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C101	T	K9	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C103	B	T7	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C104	T	F3	CHIPCAP NP0 22P J 50V 0402	Ceramic Capacitor
C105	T	Q5	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C106	T	Q5	CHIPCAP NP0 270P J 50V 0402	Ceramic Capacitor
C108	B	S6	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C109	T	P5	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C110	B	T5	CHIPCAP NP0 10P J 50V 0402	Ceramic Capacitor
C111	B	T4	CHIPCAP NP0 10P J 50V 0402	Ceramic Capacitor
C112	B	T5	CHIPCAP NP0 10P J 50V 0402	Ceramic Capacitor
C113	B	T5	CHIPCAP NP0 10P J 50V 0402	Ceramic Capacitor
C120	T	H5	CHIPCAP X5R 1U K 6V3 0603	Ceramic Capacitor
C121	B	T6	CHIPCAP FEEDTHRU 100N M 25V 0805	Ceramic Capacitor
C130	T	N8	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C133	T	L6	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C134	T	M7	CHIPCAP NP0 1P2 B 50V 0402	Ceramic Capacitor
C135	T	M7	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C136	T	M7	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C137	T	N8	CHIPCAP NP0 56P J 50V 0402	Ceramic Capacitor
C138	T	M7	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C139	T	O7	CHIPCAP X5R 2U2 K 6V3 0603	Ceramic Capacitor
C140	T	O7	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C141	T	O8	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C142	T	O7	CHIPCAP X5R 1U K 16V 0603	Ceramic Capacitor
C143	T	O7	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C144	T	O7	CHIPCAP X5R 1U K 16V 0603	Ceramic Capacitor
C151	B	S5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C157	B	S5	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C158	B	S5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C159	T	Q4	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C160	T	R4	CHIP ARRAY X5R 2X10N M 16V 0405	Ceramic Capacitor
C161	T	R4	CHIP ARRAY X5R 2X10N M 16V 0405	Ceramic Capacitor
C162	T	E5	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C165	B	S6	CHIPCAP NP0 68P J 50V 0402	Ceramic Capacitor
C166	B	R6	CHIPCAP X7R 33N K 10V 0402	Ceramic Capacitor
C167	B	R5	CHIPCAP X7R 33N K 10V 0402	Ceramic Capacitor
C168	B	R6	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C169	B	R6	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C170	B	R5	CHIPCAP X7R 33N K 10V 0402	Ceramic Capacitor
C171	B	R5	CHIPCAP X7R 33N K 10V 0402	Ceramic Capacitor
C172	T	H5	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C173	T	G6	CHIPCAP X5R 470N K 6.3V 0402	Ceramic Capacitor
C175	T	H7	CHIP ARRAY X5R 2X47N K 10V 0405	Other Capacitor
C176	T	Q4	CHIP ARRAY NP0 2X27P K 25V 0405	Other Capacitor
C177	T	G6	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C200	B	S3	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C202	B	S4	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C209	B	S3	CHIPCAP NP0 12P J 50V 0402	Ceramic Capacitor
C210	B	S5	CHIPCAP NP0 12P J 50V 0402	Ceramic Capacitor
C218	B	P4	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C220	B	P4	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C236	B	P3	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C237	B	P3	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C238	B	S3	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C239	B	P5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C240	B	P5	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C241	B	S5	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C245	B	Q5	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C260	B	Q2	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C261	B	P6	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C262	B	R2	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C270	T	O5	CHIPCAP X5R 10U M 6V3 T 1.0 0805	Ceramic Capacitor
C271	T	O5	CHIPCAP X5R 10U M 6V3 T 1.0 0805	Ceramic Capacitor
C272	T	O6	CHIPCAP X5R 10U M 6V3 T 1.0 0805	Ceramic Capacitor
C282	B	S4	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C283	B	Q6	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C284	B	Q6	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C285	B	Q5	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C286	B	S5	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C287	B	S4	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C288	B	S5	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C289	B	S4	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C290	B	S3	CHIPCAP X5R 1U K 16V 0603	Ceramic Capacitor
C291	B	R3	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C292	B	P3	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C293	B	Q3	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C294	B	Q3	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C295	B	R3	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C296	B	R3	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C297	B	S3	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C298	B	S3	CHIPCAP X5R 1U K 6V3 0603	Ceramic Capacitor
C299	B	S3	CHIPCAP X5R 1U K 6V3 0603	Ceramic Capacitor
C300	T	R5	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C301	T	C8	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C302	T	B5	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C304	T	M5	CHIPCAP X5R 1U K 16V 0603	Ceramic Capacitor
C305	T	M5	CHIPCAP X5R 1U K 6V3 0603	Ceramic Capacitor
C306	T	C8	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C307	T	E8	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C308	T	M6	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C309	T	M5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C310	T	M6	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C311	T	L6	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C312	B	N7	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C313	B	M7	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C321	T	M5	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C322	T	M4	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C323	T	M4	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C324	T	M4	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C325	T	M4	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C326	B	N7	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C327	B	M8	CHIP ARRAY NP0 2X22P K 25V 0405	Ceramic Capacitor
C350	T	F2	CHIPCAP X5R 4U7 K 6.3V 0603	Ceramic Capacitor
C351	T	G2	CHIPCAP NP0 22P J 50V 0402	Ceramic Capacitor
C352	T	G2	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C353	T	G2	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C357	T	P8	CHIPCAP X7R 10N J 16V 0402	Ceramic Capacitor
C358	T	P8	CHIPCAP X7R 47N K 10V 0402	Ceramic Capacitor
C359	T	P6	CHIPCAP X7R 22N K 16V 0402	Ceramic Capacitor
C361	T	R7	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C362	T	P7	CHIPCAP X7R 22N K 16V 0402	Ceramic Capacitor
C363	T	R8	CHIP ARRAY X5R 2X47N K 10V 0405	Other Capacitor
C364	T	Q6	CHIPCAP X7R 22N K 16V 0402	Ceramic Capacitor
C365	T	R8	CHIP ARRAY X5R 2X33N M 10V 0405	Other Capacitor
C366	T	R8	CHIPCAP X7R 47N K 10V 0402	Ceramic Capacitor
C367	T	Q8	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C370	T	P8	CHIPCAP X7R 4N7 K 25V 0402	Ceramic Capacitor
C371	T	Q8	CHIPCAP X7R 22N K 16V 0402	Ceramic Capacitor
C372	T	Q8	CHIPCAP X5R 1U K 6V3 0603	Ceramic Capacitor
C373	T	R6	CHIPCAP X7R 22N K 16V 0402	Ceramic Capacitor
C374	T	Q6	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C375	T	Q6	CHIPCAP X7R 2N2 K 50V 0402	Ceramic Capacitor
C378	T	Q8	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C379	T	P8	CHIPCAP NP0 47P J 50V 0402	Ceramic Capacitor
C380	T	R7	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C382	T	R7	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C384	T	R7	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C385	T	R7	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C390	T	K7	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C401	B	N2	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C402	B	M2	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C403	B	M4	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C404	B	P6	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C405	B	N2	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C406	B	N2	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C407	B	M2	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C408	B	M4	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C409	B	M4	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C410	T	N5	CHIPCAP X5R 1U K 6V3 0603	Ceramic Capacitor
C411	T	N5	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C412	B	O2	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C413	B	O2	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C421	B	P2	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C422	B	N2	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C450	B	O7	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C451	B	O8	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C452	B	O8	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C453	B	Q8	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C455	B	Q6	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C456	B	R6	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C463	B	O7	CHIPCAP X5R 220N K 6.3V 0402	Ceramic Capacitor
C464	B	M7	CHIPCAP X5R 220N K 6.3V 0402	Ceramic Capacitor
C465	B	M6	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C466	B	O8	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C500	T	L4	CHIPCAP X7R 3N9 J 50V 0402	Ceramic Capacitor
C501	T	I8	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C502	T	K3	CHIPCAP X7R 1N0 J 50V 0402	Ceramic Capacitor
C503	T	I6	CHIPCAP NP0 150P J 50V 0402	Ceramic Capacitor
C504	T	I6	CHIPCAP NP0 2N2 J 16V 0603	Ceramic Capacitor
C505	T	K5	CHIPCAP NP0 270P J 50V 0402	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C506	T	I3	CHIPCAP NP0 3P9 C 50V 0402	Ceramic Capacitor
C508	T	I2	CHIPCAP NP0 220P J 25V 0402	Ceramic Capacitor
C511	T	C7	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C512	T	H5	CHIPCAP X7R 2N2 J 50V 0402	Ceramic Capacitor
C513	T	J2	CHIPCAP NP0 2N2 J 16V 0603	Ceramic Capacitor
C514	T	K5	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C515	T	L4	CHIPCAP NP0 12P J 50V 0402	Ceramic Capacitor
C520	T	K4	CHIPCAP NP0 56P J 50V 0402	Ceramic Capacitor
C522	T	K2	CHIPCAP NP0 18P J 50V 0402	Ceramic Capacitor
C531	T	B4	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C532	T	I3	CHIPCAP NP0 18P J 50V 0402	Ceramic Capacitor
C533	T	J2	CHIPCAP NP0 56P J 50V 0402	Ceramic Capacitor
C535	T	K5	CHIPCAP NP0 47P J 50V 0402	Ceramic Capacitor
C536	T	K5	CHIPCAP NP0 47P J 50V 0402	Ceramic Capacitor
C537	T	K5	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C540	T	L3	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C543	T	I5	CHIPCAP NP0 82P J 50V 0402	Ceramic Capacitor
C545	T	H5	CHIP ARRAY NP0 4X470P J 16V 0612	Ceramic Capacitor
C549	T	I5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C550	T	K3	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C551	T	K5	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C552	T	J5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C553	T	J5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C554	T	J3	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C555	T	I5	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C560	T	I8	CHIPCAP NP0 10P J 50V 0402	Ceramic Capacitor
C568	T	K4	CHIPCAP NP0 HQ 0P7 B 16V 0402	Ceramic Capacitor
C700	T	E4	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C701	T	B4	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C702	T	B5	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C703	T	C3	CHIPCAP X7R 10N J 16V 0402	Ceramic Capacitor
C704	T	D3	CHIPCAP X7R 10N J 16V 0402	Ceramic Capacitor
C705	T	J3	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C706	T	J3	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C707	T	C2	CHIPCAP NP0 1P8 C 50V 0402	Ceramic Capacitor
C709	T	J3	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C710	T	J3	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C718	T	B4	CHIPCAP X7R 1N0 K 50V 0402	Ceramic Capacitor
C723	T	C3	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C725	T	D6	CHIPCAP X5R 4U7 K 6V3 0805	Ceramic Capacitor
C726	T	D6	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C727	T	F5	CHIPTCAP 68U M 16V 6.0X3.2X2.6	Electrolytic Capacitor
C728	T	D5	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C729	T	C5	CHIPCAP NP0 56P J 50V 0402	Ceramic Capacitor
C804	T	B7	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C805	T	B6	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C806	T	B7	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C807	T	I3	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C808	T	I3	CHIPCAP NP0 100P J 50V 0402	Ceramic Capacitor
C809	T	D7	CHIPCAP NP0 1P0 C 50V 0402	Ceramic Capacitor
C810	T	D7	CHIPCAP NP0 3P3 C 50V 0402	Ceramic Capacitor
C826	T	C8	CHIPCAP NP0 2P2 C 50V 0402	Ceramic Capacitor
C827	T	B8	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C828	T	B8	CHIPCAP NP0 15P J 50V 0402	Ceramic Capacitor
C829	T	B7	CHIPCAP NP0 1P2 C 50V 0402	Ceramic Capacitor
C831	T	B6	CHIPCAP NP0 47P J 50V 0402	Ceramic Capacitor
C901	T	G7	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C902	T	G7	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C903	T	G6	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor

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ITEM	SIDE	XY	PART NAME	TYPE
C904	T	P4	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C906	T	G8	CHIPCAP X5R 10U M 6V3 T 1.0 0805	Ceramic Capacitor
C907	T	H7	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	Ceramic Capacitor
C908	T	H8	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
C910	T	P4	CHIPCAP X5R 100N K 10V 0402	Ceramic Capacitor
C911	T	P4	CHIPCAP X5R 1U K 6V3 0603	Ceramic Capacitor
C912	T	O3	CHIPCAP X7R 10N K 16V 0402	Ceramic Capacitor
C913	T	P4	CHIPCAP X5R 4U7 K 6V3 T-EQUAL-0.95 0805	Ceramic Capacitor
C915	T	G7	CHIPCAP NP0 27P J 50V 0402	Ceramic Capacitor
D130	T	M7	1XINV 1.8-5.5V SC70-5	Logic IC
D200	B	Q4	UEMEK2v0 LF WDENA TFBGA244	RF ASIC
D400	B	O4	TIKUEDGE1.1 F751728A C035 288UBGA	Digital ASIC
D450	B	P7	FLASH 8MX16 1.8/1.8V FBGA44	Memory IC
D455	B	N6	SDRAM 8MX16 1.8V/1.8V WBGA60 PBFREE	Memory IC
F100	B	T7	SM FUSE FF 1-1.5A 32V 0402	Fuse And Protector
G300	T	K8	CELL CAPACITOR 0.015MAH 3V3	Battery And Battery Cell
G500	T	I7	VCO 3296-3980MHZ 2.7V 20MA EDGE	VCO
G501	T	K4	VCTCXO 26MHZ+-3PPM 2.7V 1.3MA GSM	VCTCXO
L102	B	S5	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L103	B	T5	CHIP COIL 68NH J Q12/100MHZ 0603	Fixed Inductor
L104	B	T6	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L105	B	T5	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L130	T	N8	CHIP COIL 22N J Q28/800MHZ 0402	Fixed Inductor
L133	T	M7	CHIP COIL 22N J Q28/800MHZ 0402	Fixed Inductor
L150	T	A7	CHIP BEAD ARRAY 2X1000R 0405	EMC Component
L151	B	S6	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L152	T	R4	CHIP BEAD ARRAY 2X1000R 0405	EMC Component
L153	B	T4	CHIP BEAD ARRAY 2X1000R 0405	EMC Component

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ITEM	SIDE	XY	PART NAME	TYPE
L154	B	T3	CHIP BEAD ARRAY 2X1000R 0405	EMC Component
L155	T	E4	CHIP COIL 30nH J Q65/500MHz 0805	Fixed Inductor
L156	T	F4	CHIP COIL 30nH J Q65/500MHz 0805	Fixed Inductor
L206	B	Q6	FERRITE BEAD 0R3 47R/100MHZ 0603	EMC Component
L260	B	Q2	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L261	B	P6	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L262	B	R2	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L263	B	S2	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L264	B	Q2	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L265	B	Q6	FERRITE BEAD 0R5 600R/100MHZ 0603	EMC Component
L270	T	O5	CHOKE 10uH M 0.53A 0R48 4.8x4.8x1.2	Fixed Inductor
L300	T	Q5	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L301	T	M6	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L302	T	M6	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L303	T	N6	CHOKE 22U M 0.33A 1R5 3.3X3.3X1.3	Fixed Inductor
L309	B	M7	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L356	T	P7	CHIP COIL 33N G Q40/250MHZ 0603	Fixed Inductor
L357	T	P7	CHIP COIL 33N G Q40/250MHZ 0603	Fixed Inductor
L358	T	Q8	CHIP COIL 120N G Q32/150MHZ 0603	Fixed Inductor
L500	T	K4	CHIP COIL 4N7 +-0N3 Q7/100M 0402	Fixed Inductor
L501	T	K4	CHIP COIL 4N7 +-0N3 Q7/100M 0402	Fixed Inductor
L502	T	I8	CHIP COIL 18N J Q7/100MHZ 0402	Fixed Inductor
L504	T	J5	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L515	T	L5	CHIP COIL 4U7 K Q35/10MHZ 0603	Fixed Inductor
L700	T	J3	CHIP COIL 33N J Q7/100MHZ 0402	Fixed Inductor
L701	T	C2	CHIP COIL 22N J Q7/100MHZ 0402	Fixed Inductor
L703	T	D6	FERR.BEAD 0R03 42R/100MHZ 3A 0805	EMC Component
L800	T	B7	CHIP COIL 3N3 +-0N3 Q6/100M 0402	Fixed Inductor
L804	T	D7	CHIP COIL 6N8 +-0N1 Q26/1GHZ 0402	Fixed Inductor
L805	T	I3	CHIP COIL 8N2 J Q7/100MHZ 0402	Fixed Inductor

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ITEM	SIDE	XY	PART NAME	TYPE
L806	T	I4	CHIP COIL 18N J Q7/100MHZ 0402	Fixed Inductor
L807	T	I4	CHIP COIL 18N J Q7/100MHZ 0402	Fixed Inductor
L822	T	I4	CHIP COIL 3N9 +-0N3 Q7/100M 0402	Fixed Inductor
L823	T	I3	CHIP COIL 3N9 +-0N3 Q7/100M 0402	Fixed Inductor
L824	T	C8	CHIP COIL 3N3 +-0N3 Q6/100M 0402	Fixed Inductor
L900	T	G8	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
L901	T	G7	FERRITE BEAD 0.6R 600R/100MZ 0402	EMC Component
N100	T	Q5	NUT/CP2137 ASIC HBCC16++	RF ASIC
N120	T	H5	CURRNT SENS LM3820 USMD10 PB-FREE	Power Management IC
N130	T	N7	TJA4 BLUETOOTH DEVICE	Mixed Signal ASIC
N131	T	O8	LI VREG TK63128B-G 2.8V WLCSP4	Power Management IC
N150	T	G5	AF AMP 0.4W LM4890/NCP2890 PBFREE	Analog IC
N270	T	O5	DC/DC CONV LM2708HTLX-1.57V/1.35V USMD10	Power Management IC
N300	T	M5	DC/DC CONV TK65600 USMD8	Power Management IC
N350	T	G2	IRDA CIM-50M5A **** RESERVED ****	Infrared
N356	T	Q7	FM RECEIVER(TEA5767HN) LQFP40	Other IC
N700	T	C4	PW AMP RF9304 QUAD GSM/EDGE	Power Amplifier
N900	T	G8	REG LP3990TLX-2.8 *NO NEW DESIGN* USMD4	Power Management IC
N901	T	G7	REG LP3990TLX-2.5 NOPB USMD4	Power Management IC
N910	T	O4	VREG 2.85/150MA(LP3987-2.85)USMD5	Analog IC
R100	T	K9	NTC RES 0W1 47K J B 4050+-3% 0402	Variable Resistor
R101	T	R5	CHIPRES 0W06 100K J 0402	Fixed Resistor
R102	T	R5	CHIPRES 0W06 100R J 0402	Fixed Resistor
R104	T	P5	CHIPRES 0W06 220K J 0402	Fixed Resistor
R105	T	Q6	CHIPRES 0W06 220K J 0402	Fixed Resistor
R106	B	T5	CHIPRES 0W06 33R J 0402	Fixed Resistor

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ITEM	SIDE	XY	PART NAME	TYPE
R107	T	Q5	ASIP USB2 FILTER BGA10 PBFREE	Integrated Discretes
R108	B	T5	CHIP VARISTOR VWM14V VC50V 0402	Variable Resistor
R121	T	H4	CHIPRES 0W06 2K2 J 0402	Fixed Resistor
R122	T	H4	CHIPRES 0W06 2K2 J 0402	Fixed Resistor
R130	T	M7	CHIPRES 0W06 10K J 0402	Fixed Resistor
R131	T	M7	CHIPRES 0W06 2K7 J 0402	Fixed Resistor
R132	T	M7	CHIPRES 0W06 2R2 J 0402	Fixed Resistor
R133	T	L7	CHIPRES 0W06 100K J 0402	Fixed Resistor
R135	T	N8	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R136	T	N8	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R137	T	M7	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R150	B	Q5	RES NETWORK 0W06 2X10R J 0404	Resistor Network
R153	B	S5	CHIPRES 0W06 100R J 0402	Fixed Resistor
R154	B	S6	CHIPRES 0W06 2K2 J 0402	Fixed Resistor
R156	B	S5	CHIPRES 0W06 100R J 0402	Fixed Resistor
R157	B	S6	RES NETWORK 0W06 2X2K2 J 0404	Resistor Network
R158	B	R5	CHIPRES 0W06 33K J 0402	Fixed Resistor
R159	T	Q4	RES NETWORK 0W06 2X10R J 0404	Resistor Network
R160	T	Q4	RES NETWORK 0W06 2X10R J 0404	Resistor Network
R161	B	T4	VAR.ARRAY 2X16V 824-915MHZ 0405	Variable Resistor
R162	B	Q5	RES NETWORK 0W06 2X2K2 J 0404	Resistor Network
R163	B	T3	VAR.ARRAY 2X16V 824-915MHZ 0405	Variable Resistor
R164	B	Q5	RES NETWORK 0W06 2X2K2 J 0404	Resistor Network
R165	B	S5	CHIPRES 0W06 10K J 0402	Fixed Resistor
R166	B	R5	ASIP MIC W/ESD RES+CAP+ZDI BGA11	Integrated Discretes
R167	T	A7	VAR.ARRAY 2X16V 824-915MHZ 0405	Variable Resistor
R168	T	H5	CHIPRES 0W06 22K F 200PPM 0402	Fixed Resistor
R169	T	H7	RES NETWORK 0W06 2X22K J 0404	Resistor Network
R171	T	H6	CHIPRES 0W06 22K F 200PPM 0402	Fixed Resistor

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ITEM	SIDE	XY	PART NAME	TYPE
R200	B	S4	CHIPRES 0W5 0R22 J 200PPM 1210	Fixed Resistor
R202	B	P5	CHIPRES 0W06 100K J 0402	Fixed Resistor
R203	B	P4	CHIPRES 0W06 100K J 0402	Fixed Resistor
R206	B	P4	CHIPRES 0W06 4K7 J 0402	Fixed Resistor
R207	B	P5	CHIPRES 0W06 4K7 J 0402	Fixed Resistor
R211	B	S5	CHIPRES 0W06 470R J 0402	Fixed Resistor
R300	T	R5	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R302	T	B6	CHIPRES 0W06 10K J 0402	Fixed Resistor
R303	B	M8	CHIPRES 0W06 1K5 J 0402	Fixed Resistor
R304	B	M8	CHIPRES 0W06 680R J 0402	Fixed Resistor
R305	B	N7	CHIP VARISTOR VWM14V VC50V 0402	Variable Resistor
R306	T	M5	CHIPRES 0W06 33R J 0402	Fixed Resistor
R307	T	L6	CHIPRES 0W06 100K J 0402	Fixed Resistor
R312			CHIPRES 0W06 68R J 0402	Fixed Resistor
R317			CHIPRES JUMPER 0R0 0402	Fixed Resistor
R350	T	F2	CHIPRES 0W5 4R7 J 200PPM 1210	Fixed Resistor
R356	T	P6	CHIPRES 0W06 12R J 0402	Fixed Resistor
R357	T	P7	CHIPRES 0W06 33K J 0402	Fixed Resistor
R358	T	P7	CHIPRES 0W06 47R J 0402	Fixed Resistor
R359	T	P8	CHIPRES 0W06 10K J 0402	Fixed Resistor
R360	T	P8	CHIPRES 0W06 100K J 0402	Fixed Resistor
R362	T	Q8	CHIPRES 0W06 5R6 J 0402	Fixed Resistor
R363	T	P6	CHIPRES 0W06 10K J 0402	Fixed Resistor
R367	T	Q8	CHIPRES 0W06 18K F 100PPM 0603	Fixed Resistor
R369	T	Q6	CHIPRES 0W06 33K J 0402	Fixed Resistor
R388	T	L8	ASIP SIM INTERFACE ** PB-FREE **	Integrated Discretes
R396	T	M3	RES NETWORK 0W06 2X22R J 0404	Resistor Network
R397	T	M3	RES NETWORK 0W06 2X22R J 0404	Resistor Network
R398	T	M4	CHIP VARISTOR VWM14V VC50V 0402	Variable Resistor

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ITEM	SIDE	XY	PART NAME	TYPE
R399	T	M4	CHIPRES 0W06 100R J 0402	Fixed Resistor
R402	B	P6	CHIPRES 0W06 47R J 0402	Fixed Resistor
R406	B	O5	CHIPRES 0W06 10K J 0402	Fixed Resistor
R409	T	N5	CHIPRES 0W06 10R J 0402	Fixed Resistor
R414	B	O2	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R420	B	N2	CHIPRES 0W06 100R J 0402	Fixed Resistor
R421	B	P3	CHIPRES 0W06 10K J 0402	Fixed Resistor
R422	B	Q3	CHIPRES 0W06 27K F 0402	Fixed Resistor
R450	B	O2	CHIPRES 0W06 4K7 J 0402	Fixed Resistor
R455	B	S6	CHIPRES 0W06 100K J 0402	Fixed Resistor
R460	B	O6	CHIPRES 0W06 68R J 0402	Fixed Resistor
R501	T	I6	CHIPRES 0W06 1K0 J 0402	Fixed Resistor
R502	T	I6	CHIPRES 0W06 9K1 F 100PPM 0402	Fixed Resistor
R503	T	I2	CHIPRES 0W06 4K7 J 0402	Fixed Resistor
R504	T	I2	CHIPRES 0W06 12K J 0402	Fixed Resistor
R505	T	J2	CHIPRES 0W06 8K2 J 0402	Fixed Resistor
R506	T	H5	CHIPRES 0W06 100R J 0402	Fixed Resistor
R511	T	H7	RES NETWORK 0W04 2DB ATT 0404	Resistor Network
R512	T	K3	CHIPRES 0W06 10R J 0402	Fixed Resistor
R516	T	K5	RES NETWORK 0W06 2X5K6 J 0404	Resistor Network
R517	T	K5	RES NETWORK 0W06 2X5K6 J 0404	Resistor Network
R520	T	L4	CHIPRES 0W06 15K J 0402	Fixed Resistor
R522	T	I5	CHIPRES 0W06 15K J 0402	Fixed Resistor
R523	T	I5	CHIPRES 0W06 5K6 F 0402	Fixed Resistor
R525	T	I5	CHIPRES 0W06 4K7 J 0402	Fixed Resistor
R529	T	J5	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R531	T	J2	CHIPRES 0W06 100R J 0402	Fixed Resistor
R538	T	I2	CHIPRES 0W06 3K3 F 0402	Fixed Resistor
R539	T	K3	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R540	T	C7	CHIPRES 0W06 1K0 J 0402	Fixed Resistor

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ITEM	SIDE	XY	PART NAME	TYPE
R700	T	E4	CHIPRES 0W06 10R J 0402	Fixed Resistor
R701	T	B3	CHIPRES 0W06 10R J 0402	Fixed Resistor
R702	T	B5	CHIPRES 0W06 10R J 0402	Fixed Resistor
R703	T	C3	CHIPRES 0W06 33R J 0402	Fixed Resistor
R704	T	D3	CHIPRES 0W06 33R J 0402	Fixed Resistor
R706	T	C2	CHIPRES 0W06 4R3 J 0402	Fixed Resistor
R707	T	D6	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R709	T	E2	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R710	T	E2	CHIPRES 0W06 1K5 J 0402	Fixed Resistor
R712	T	D2	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R713	T	E3	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R715	T	C3	CHIPRES 0W06 2R2 J 0402	Fixed Resistor
R716	T	D3	CHIPRES 0W06 2R2 J 0402	Fixed Resistor
R800	T	B8	CHIPRES 0W06 10R J 0402	Fixed Resistor
R801	T	B7	CHIPRES 0W06 560R J 0402	Fixed Resistor
R900	B	P4	CHIPRES JUMPER 0R0 0402	Fixed Resistor
R901	T	O4	CHIPRES 0W06 4K7 J 0402	Fixed Resistor
R902	T	O4	CHIPRES 0W06 4K7 J 0402	Fixed Resistor
R906	B	P5	CHIPRES 0W06 100R F 200PPM 0402	Fixed Resistor
R907	B	P5	CHIPRES 0W06 15K J 0402	Fixed Resistor
R910	T	P4	ASIP MMC FILTER *** PB-FREE ***	Integrated Discretes
R911	T	E5	VAR.ARRAY 2X16V 824-915MHZ 0405	Variable Resistor
R913	B	P5	CHIPRES 0W06 100R F 200PPM 0402	Fixed Resistor
S320	T	C9	SM VOLUME BUTTON 16VDC 50MA	Switch And Knob
S321	T	E9	SM VOLUME BUTTON 16VDC 50MA	Switch And Knob
S323	T	A5	SM TACT SW SIDE TRAVEL 0.2 MM	Switch And Knob
T130	T	N8	TRANSF BALUN 2400+/-100MHz	Balun
T500	T	H6	TRANSF BALUN 3290-3980MHZ	Balun
T700	T	D2	TRANSF BALUN 1800+-100MHZ 2X1.25	Balun

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ITEM	SIDE	XY	PART NAME	TYPE
T800	T	H3	TRANSF BALUN 1.9GHZ+/-100MHZ 1206	Balun
V101	B	T7	TVS Diode 16V 175W FLAT-LEAD SMD	Diode
V301			TRX2 BIPOLAR 2XPNP 40V 0A1 0W12 SOT666	Bipolar Transistor BJT
V356	T	P8	CAP.DI BB202 CT 2.5 FM 0R8 SOD523	Diode
V357	T	P8	CAP.DI BB202 CT 2.5 FM 0R8 SOD523	Diode
V802	T	C8	TR BGA428 LNA1.8GHZ 19.5DB SOT363	Bipolar Transistor BJT
X100	T	G3	SM LYNX BATT CONN 3POL 12V 2A H7.	Battery Connector
X102	T	T5	SM SYSTEM CONNECTOR 14POL	System Connector
X300	B	L7	SM CONN 2X6 M P1.2250V 0.5A	Board To Board Connector
X301	B	L3	SM CONN 2X6 M P1.2250V 0.5A	Board To Board Connector
X302	B	L5	SM CONN 2X12F P0.5 PWB/PWB	Multipole Connector
X386	T	K7	SIM CONN 2X3POL H 2.20MM	SIM Connector
X900	T	F7	CAMERA MOD.SOCKET 2X7POL SPR P1.4	Socket
X910	T	P3	MMC CONN 1X7POL H 1.7MM	Other Customized Connector
Z131	T	M8	CER FILT 2441+-41.75MHZ 2.7X2.2	Ceramic Filter
Z300	T	M4	ASIP 10-CH ESD EMI FILTER BGA25	Integrated Discretes
Z301	B	N8	ASIP 10-CH ESD EMI FILTER BGA25	Integrated Discretes
Z700	T	C2	SAW FILT 897.5+-17.5MHZ 2X2.5	SAW Filter
Z806	T	D8	SAW FILT 1960+-30MHZ/3.2DB 2X2.5	SAW Filter
Z807	T	H3	SAW FILT 1842.5+-37.5MHZ 2.5X2	SAW Filter
Z808	T	H4	SAW FILT 942.5+-17.5MHZ 2.5X2	SAW Filter
Z809	T	C7	ANT.SWITCH 824-960/1710-1990MHZ	Antenna Switch

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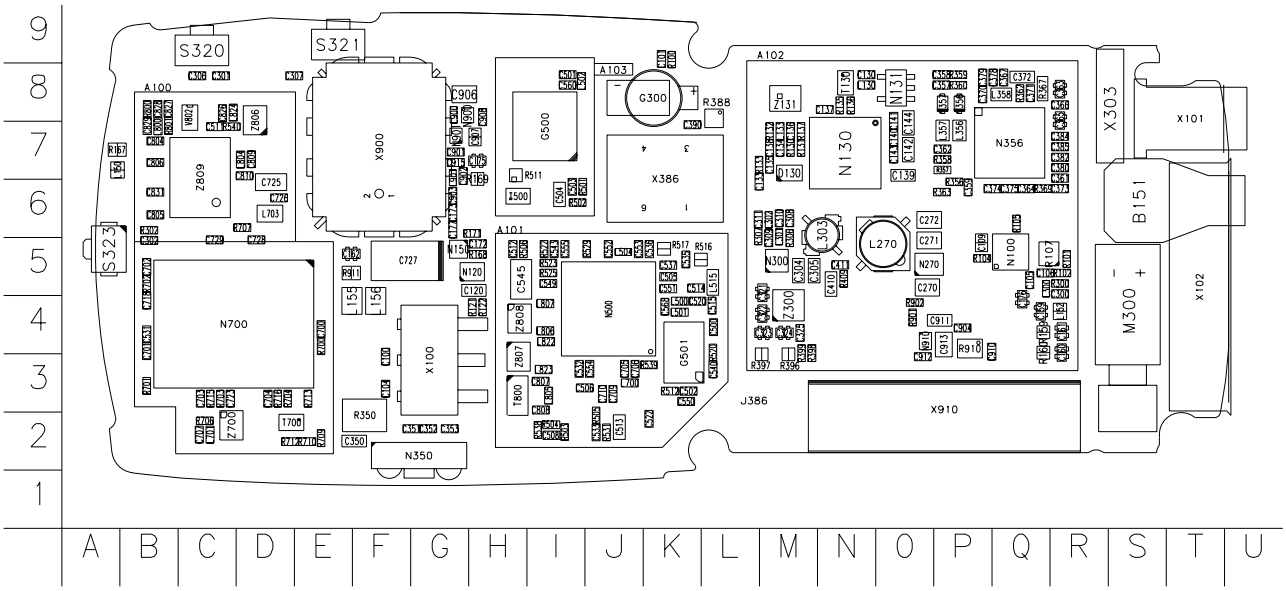
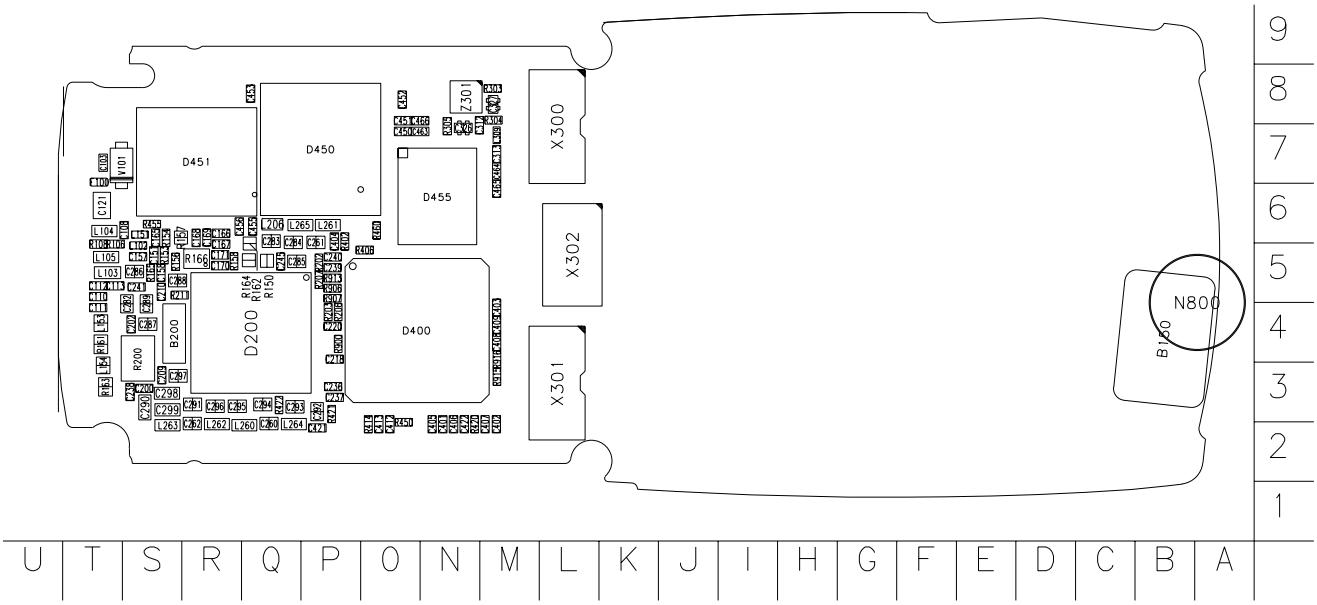
Component layouts

The component layouts are shown in A3 format in the schematics section.

Component layout (top side), 1maa_02



Component layout (bottom side), 1maa_02



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3 - Service Software Instructions

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Data Package for Phoenix (Product Specific)

Before installation

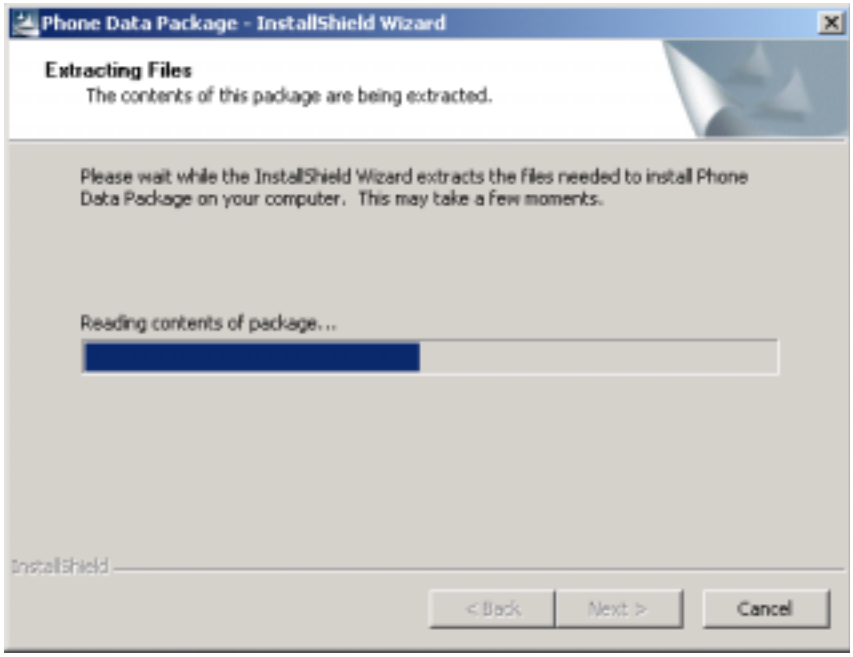
- Product Data Package contains all product specific data to make the Phoenix Service Software and tools usable with a certain phone model.
- Check that the dongle is attached to the parallel port of your computer.
- Install Phoenix Service SW.
- Download the installation package (e.g. *RH-12_dp_v_40.0_mcusw02.19.exe*) to your computer (e.g. C:\TEMP).
- Close all other programs.
- Run the application file (e.g. *RH-12_dp_v_40.0_mcusw02.19.exe)* and follow instructions on the screen.

Please note that very often the Phoenix Service SW and the Phone Specific Data Package for Phoenix come in pairs, meaning that certain version of Phoenix can only be used with certain version of Data Package. Always use the latest available versions of both. Instructions can be found in phone model specific Technical Bulletins and readme.txt files of the data packages.

Installing Phoenix data package (product specific)

Run the *RH-12_dp_v_40.0_mcusw02.19.exe* to start the installation.

When you choose “Next” the files needed for the installation will be extracted. Please wait.


Phone Data Package - InstallShield Wizard
Extracting Files
The contents of this package are being extracted.
Please wait while the InstallShield Wizard extracts the files needed to install Phone Data Package on your computer. This may take a few moments.
Reading contents of package...
InstallShield
< Back
Next >
Cancel

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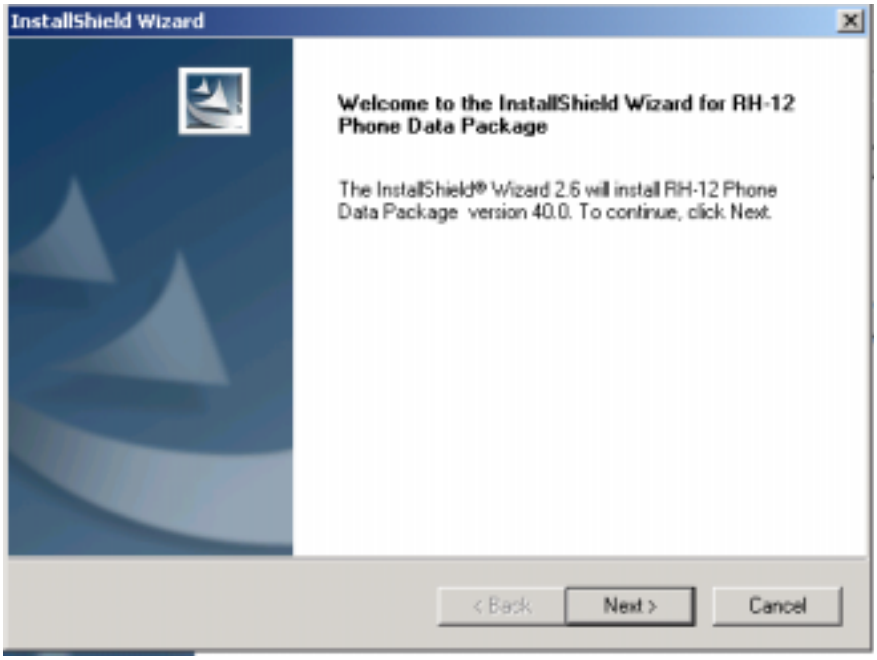
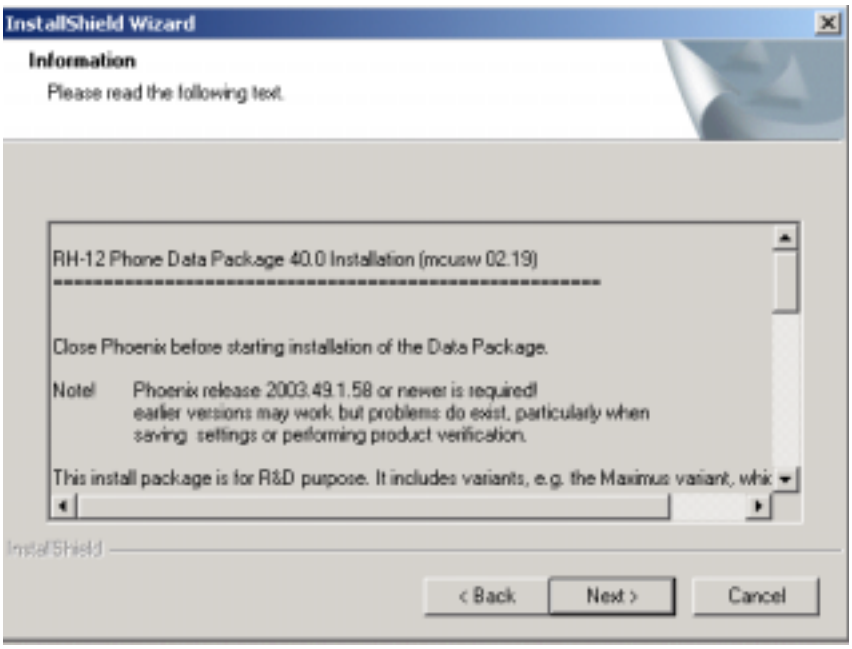
Choose “Next” to continue.


InstallShield Wizard
Welcome to the InstallShield Wizard for RH-12 Phone Data Package
The InstallShield® Wizard 2.6 will install RH-12 Phone Data Package version 40.0. To continue, click Next.
< Back
Next >
Cancel

From this view, you can see the contents of the Data Package. **Read the text carefully**. There should be information about the Phoenix version needed with this data package. Choose “Next”.


InstallShield Wizard
Information
Please read the following text.
RH-12 Phone Data Package 40.0 Installation (mcusw 02.19)
Close Phoenix before starting installation of the Data Package.
Note! Phoenix release 2003.49.1.58 or newer is required!
earlier versions may work but problems do exist, particularly when saving settings or performing product verification.
This install package is for R&D purpose. It includes variants, e.g. the Maximus variant, whic
InstallShield
< Back
Next >
Cancel

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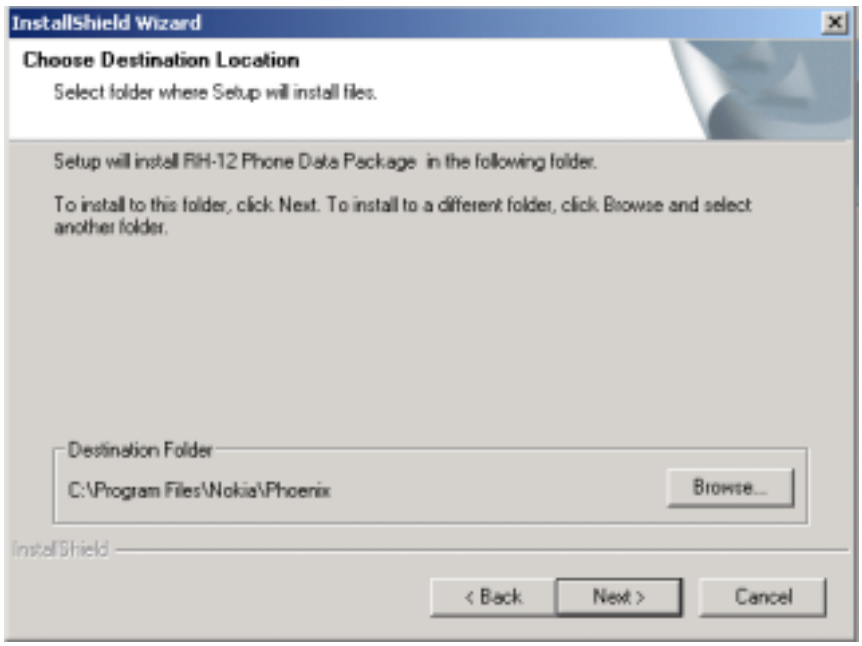
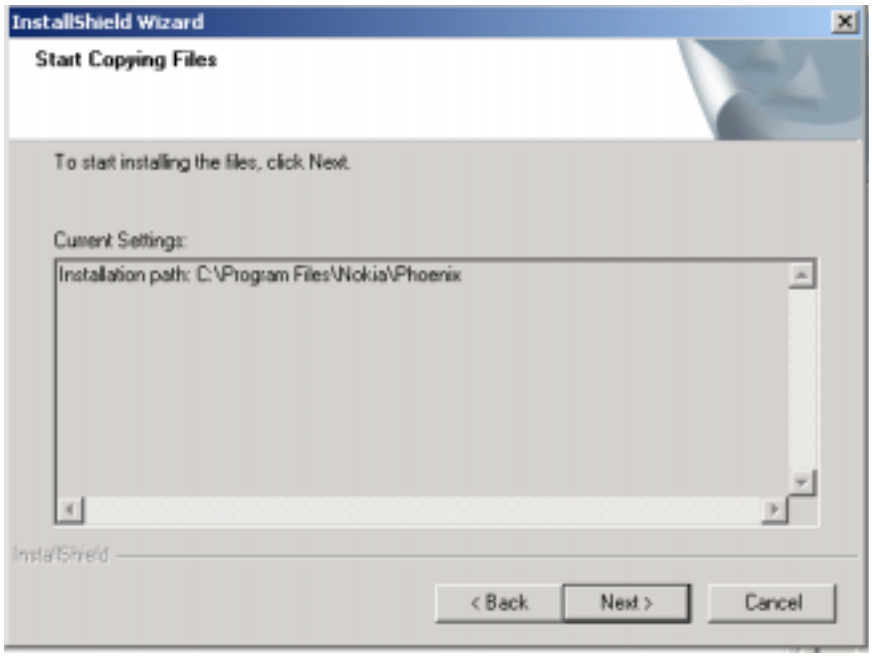
Confirm location and choose “Next” to continue. Install shield checks where the Phoenix application is installed and the directory is shown. Choose “Next” to continue.


InstallShield Wizard
Choose Destination Location
Select folder where Setup will install files.
Setup will install RH-12 Phone Data Package in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\Nokia\Phoenix
Browse...
InstallShield
< Back
Next >
Cancel

Choose “Next” to start copying the files.



Phone model specific files will be installed. Please wait.

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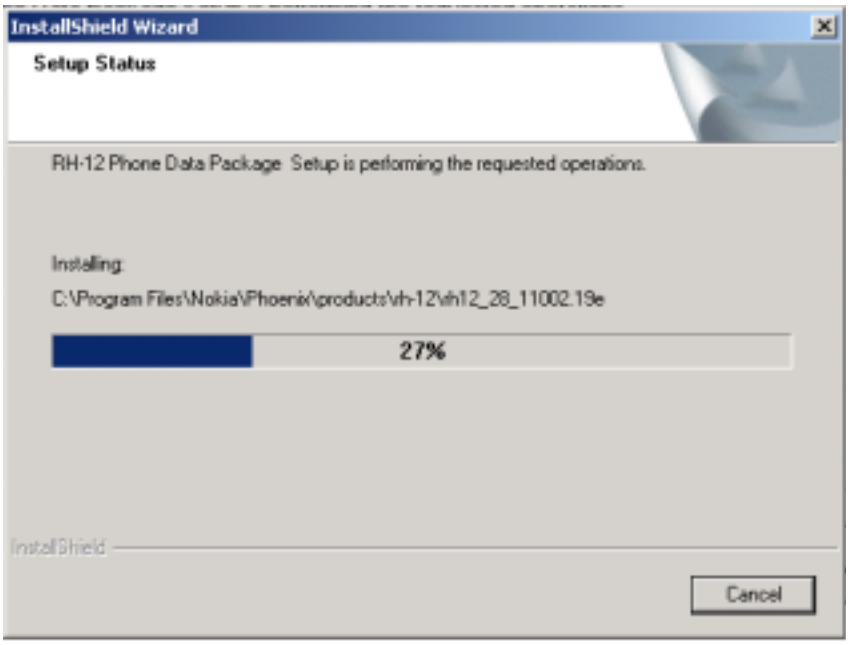
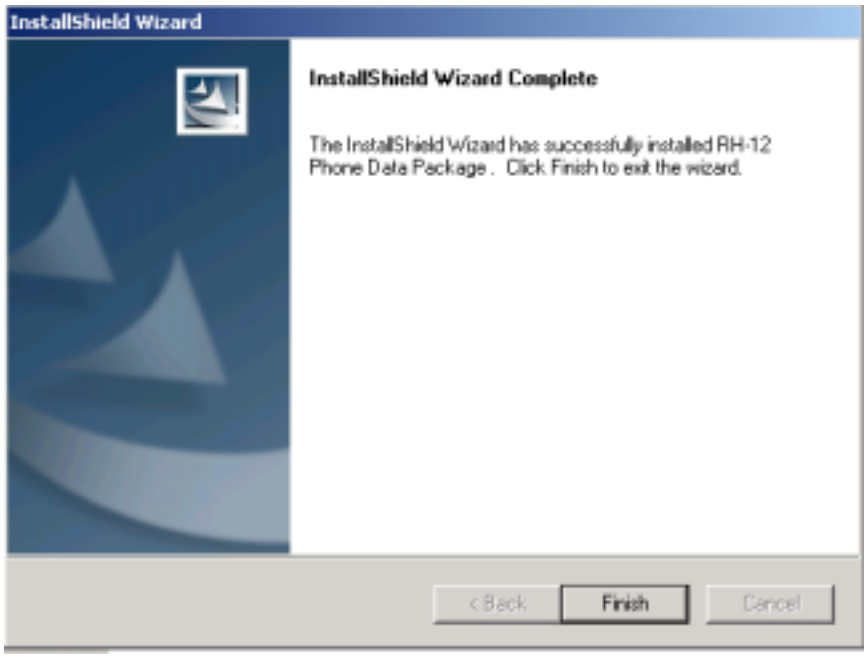


Choose “Finish” to complete the installation.


InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed RH-12 Phone Data Package. Click Finish to exit the wizard.
< Back
Finish
Cancel

You now have all phone model specific files installed in your Phoenix Service SW.

Now Phoenix can be used to for example flash phones and print type labels after:

- configuring users
- managing connections

FLS-4S can be used right away.

FPS-8* can be used after updating Flash Update Package files to it.

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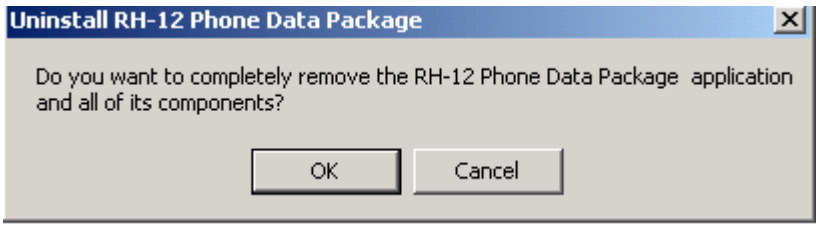
Uninstalling the data package

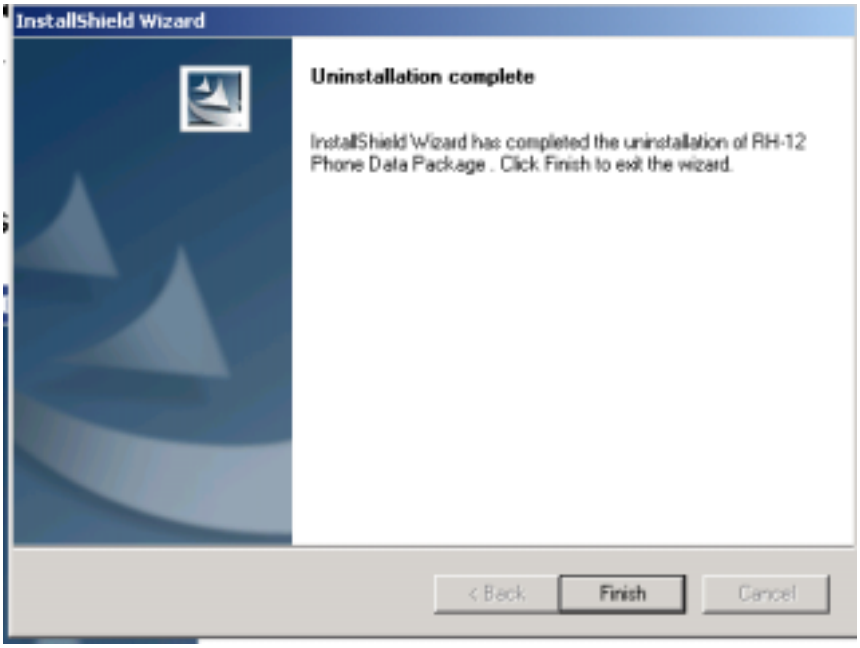
Uninstallation can also be done manually from Windows Control Panel / Add / Remove Programs / “RM-72 Phone Data Package”.

If you try to install the same version of Phoenix Data Package that you already have, you are asked if you want to uninstall the version you have on your PC. Answer “OK” to uninstall, “Cancel” if you don’t want to uninstall.


Uninstall RH-12 Phone Data Package
Do you want to completely remove the RH-12 Phone Data Package application and all of its components?
OK
Cancel

Older versions of data packages don’t need to be uninstalled unless instructions to do so are given in the readme.txt of the data package and bulletins concerning the release. Please read all related documents carefully.

Once the previously installed Data package is uninstalled, choose “Finish”.


InstallShield Wizard
Uninstallation complete
InstallShield Wizard has completed the uninstallation of RH-12 Phone Data Package . Click Finish to exit the wizard.
< Back
Finish
Cancel

Run the *RH-12_dp_v_40.0_mcusw02.19.exe* again in case you want to continue the installation from the beginning.

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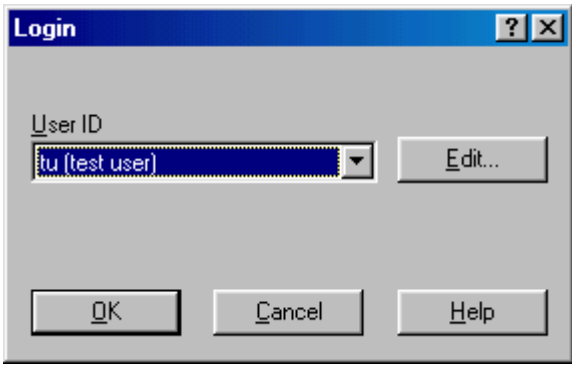
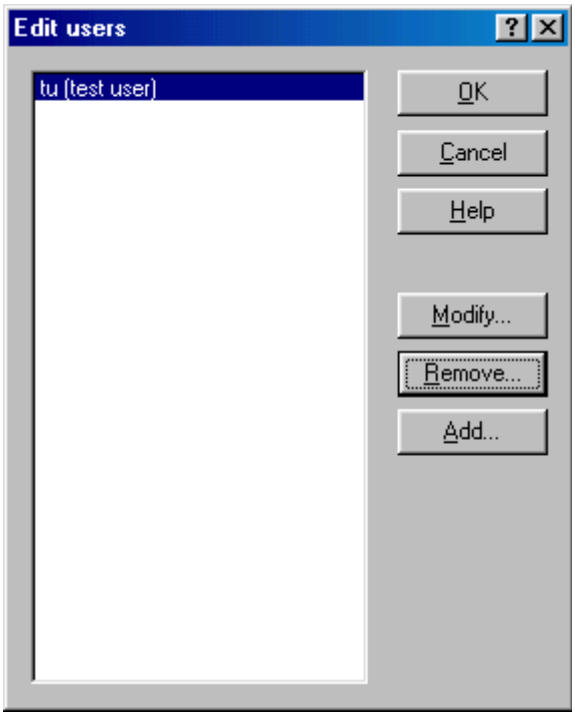
Configuring Users

Start Phoenix Service SW and Login. To add new user choose “Edit”. If user ID is already configured, choose your own user ID from the list and choose “OK”.



Choose “Add” to continue.



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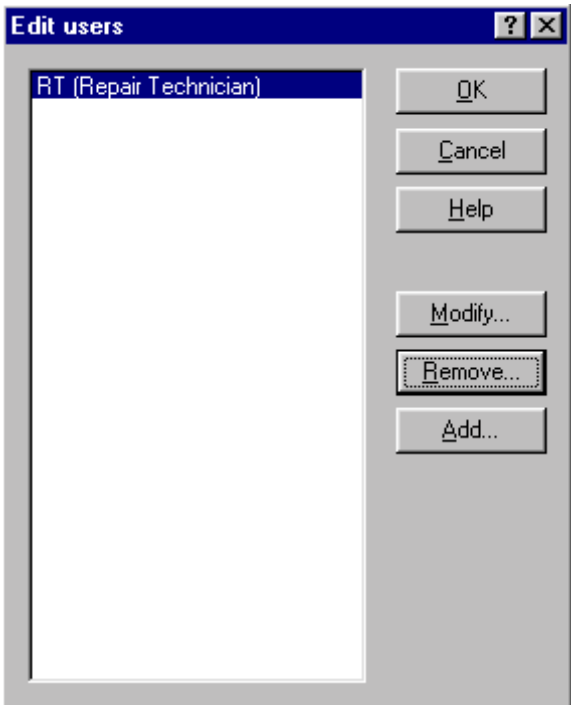
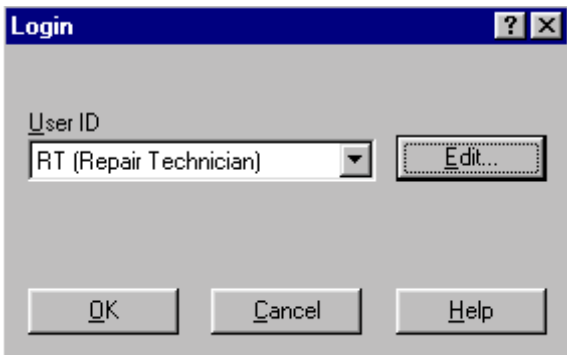
Type in your name and initials to fields and choose “OK”.

User has now been created, choose “OK”.



You are now able to login with this username, choose “OK”.



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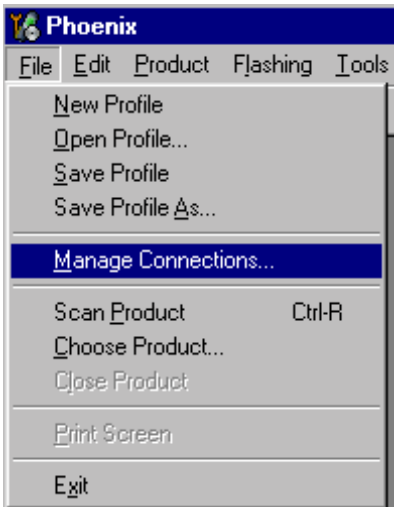
Managing Connections

Start Phoenix Service SW and Login.

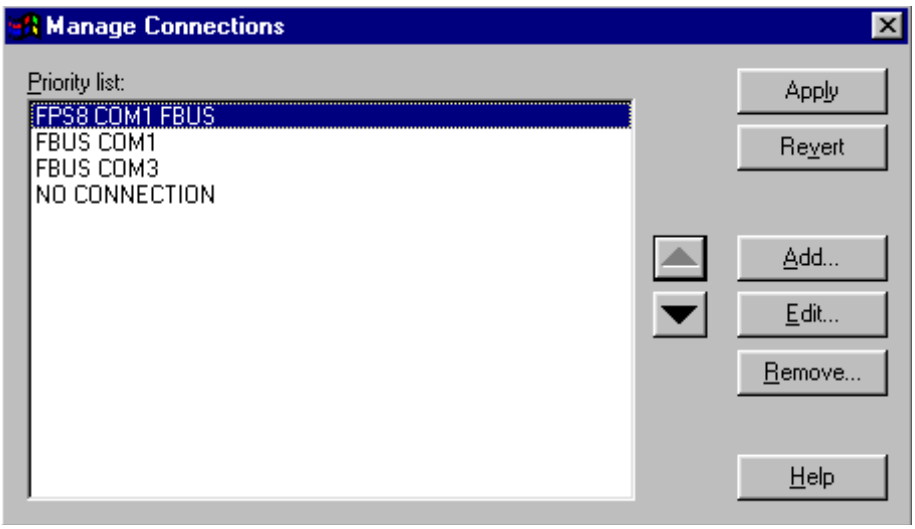
Choose “Manage Connections” From “File” Menu.



Existing connections can be selected , edited, deleted and new ones created by using this dialog.

A connection can be created either manually or by using a Connection Wizard.

To add new connection, choose “Add” and select if you want to create it manually or by using the Wizard.



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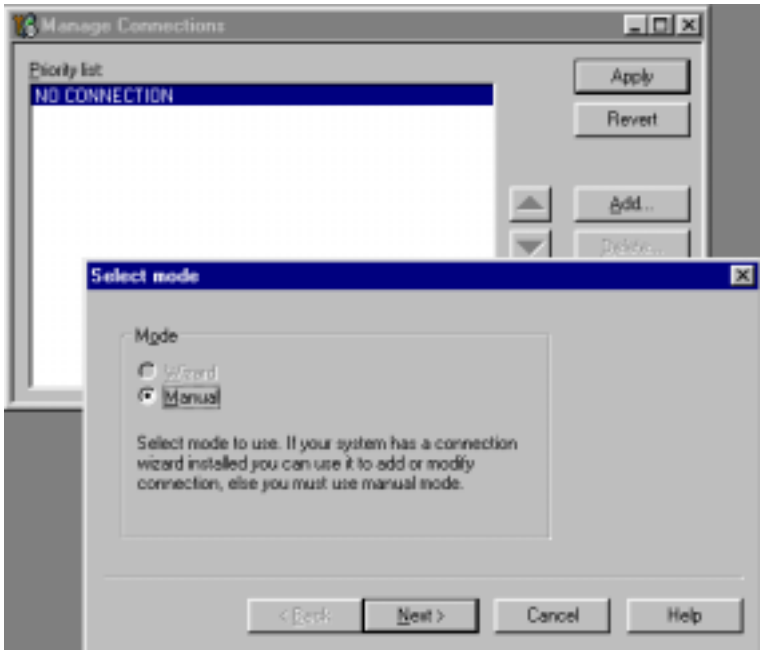
Choose “Next” to continue.

In the next dialogs you will be asked to select some settings for the connection.



Manual Settings

A) For **FLS-4S POS Flash Device** choose the following connection settings

- **Media:** FBUS
- **COM Port:** Virtual COM Port used by FLS-4 **Please check this always!**

(To check please go to Windows / Control Panel / FLS Virtual Port / Configuration)

B) For **FPS-8 Flash Prommer** choose the following connection settings:

- **Media:** FPS-8
- **Port Num:** COM Port where FPS-8 is connected
- **COMBOX_DEF_MEDIA:** FBUS

Choose “Finish” to complete.

If you use the Wizard, connect the tools and a phone to your PC and the wizard will automatically try to configure the correct connection.

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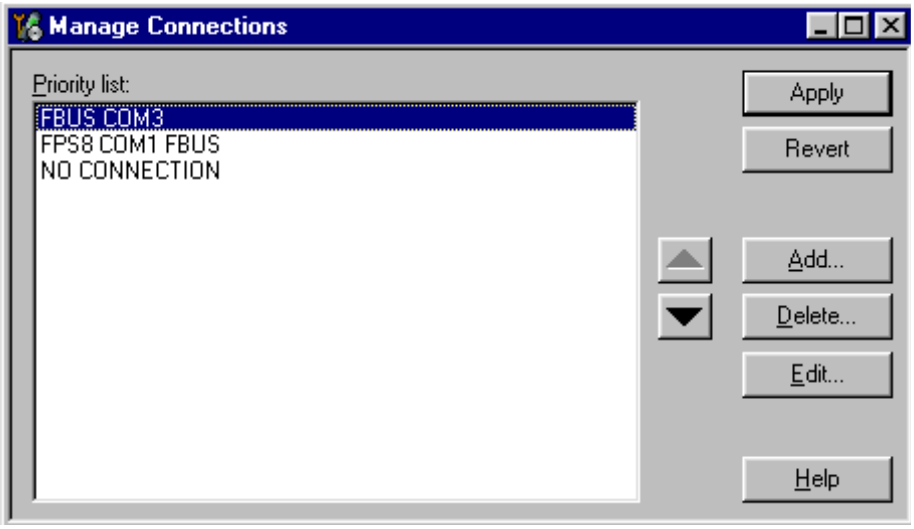
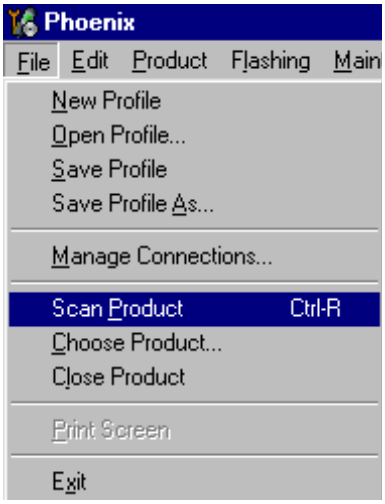
Activate the connection you want to use by clicking it and use up/down arrows to move it on top of the list. Choose “Apply”. The connection is now selected and can be used after closing the “Manage Connections” window.

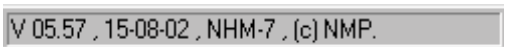


Selected connection will be shown on the right hand bottom corner of the screen.

To use the selected connection, connect the phone to Phoenix with correct service tools, make sure that it is switched on and select “Scan Product”.



When Product is found, Phoenix will load product support and when everything is ready, name of the loaded product support module and its version will be shown on the bottom of the screen.



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Updating Flash Support Files for FPS-8* and FLS-4*

Before installation

- Install Phoenix Service SW.
- Install phone model Specific Data package for Phoenix.

The flash support files are delivered in the same installation package with Phoenix data packages or newer Phoenix packages beginning from September 2003.

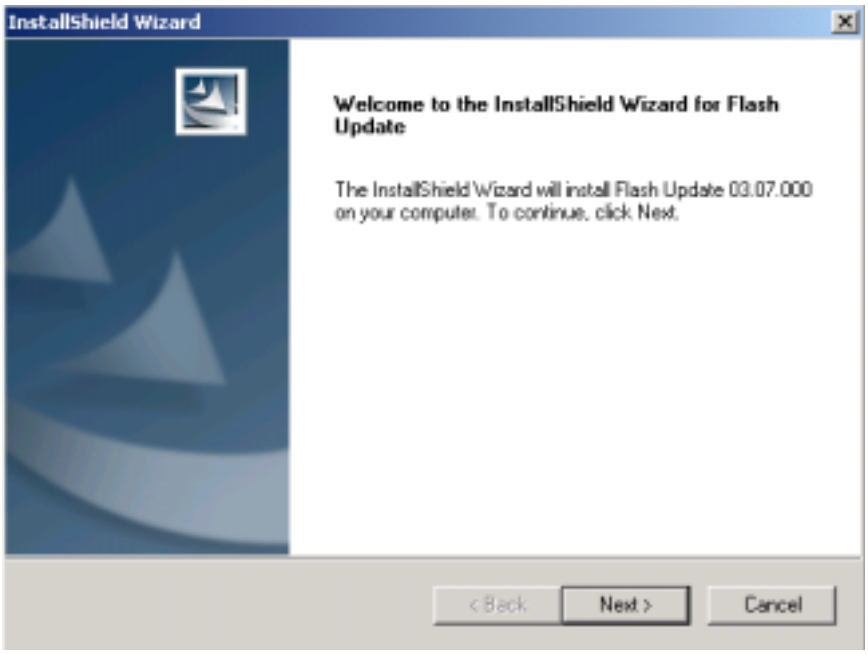
Normally it is enough to install the Phoenix and phone data package only because the Phoenix installation always includes the latest flash update package files for FLS-4S / FPS-8*.

Separate installation package for flash support files is available, and the files can be updated according to these instructions if updates appear between Phoenix / data package releases.

Installing the flash support files (only separate installation package)

If you are not using separate installation package, you can skip this section.

Start by double clicking *flash_update_03_07_000.exe*. The installation begins.


InstallShield Wizard
Welcome to the InstallShield Wizard for Flash Update
The InstallShield Wizard will install Flash Update 03.07.000 on your computer. To continue, click Next.
< Back
Next >
Cancel

If the same version of Flash Update package already exists, and you want to reinstall them, the previous package is first uninstalled. Restart installation again after that.

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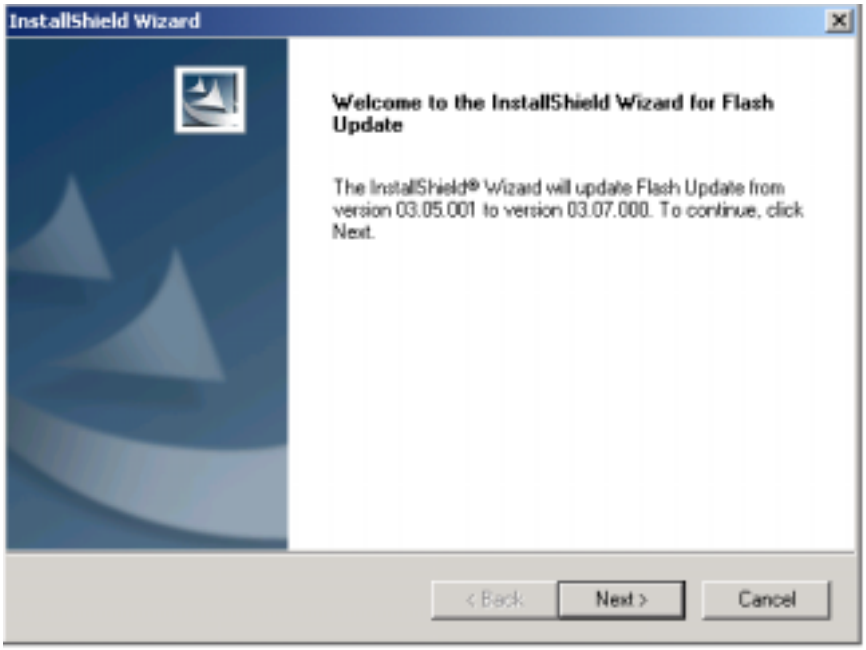
Uninstall Flash Update
Do you want to completely remove the Flash Update 03.07.000 application and all of its components?
OK
Cancel

If you try to downgrade the existing version to older ones, the setup will be aborted. If you really want to downgrade, uninstall newer files manually from Control Panel and then re run the installation again.

You have newer version of the application.
If you want to install older version you need to uninstall the current version before.
Setup will exit.
OK

If an older version exists on your PC and it needs to be updated, choose “Next” to continue the installation.


InstallShield Wizard
Welcome to the InstallShield Wizard for Flash Update
The InstallShield® Wizard will update Flash Update from version 03.05.001 to version 03.07.000. To continue, click Next.
< Back
Next >
Cancel

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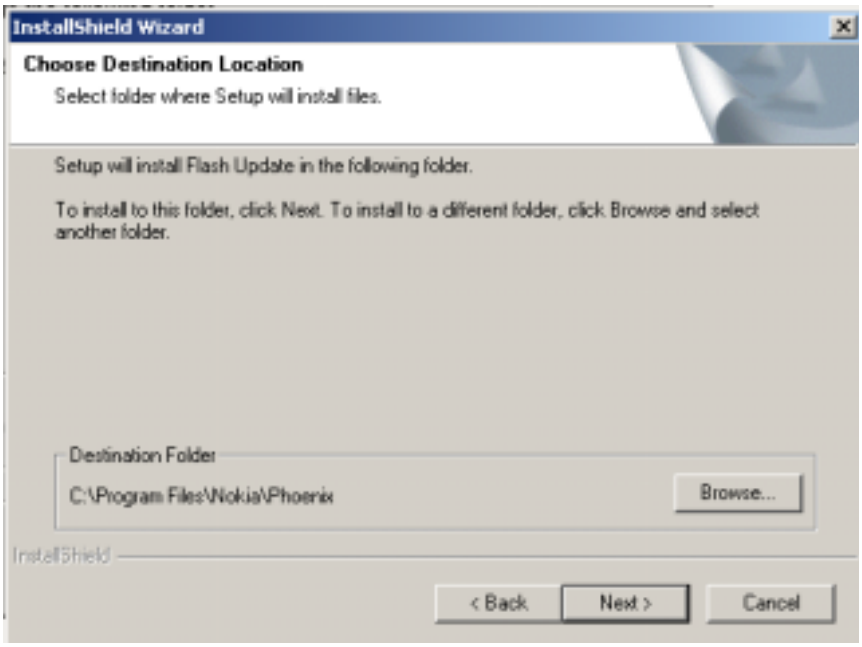
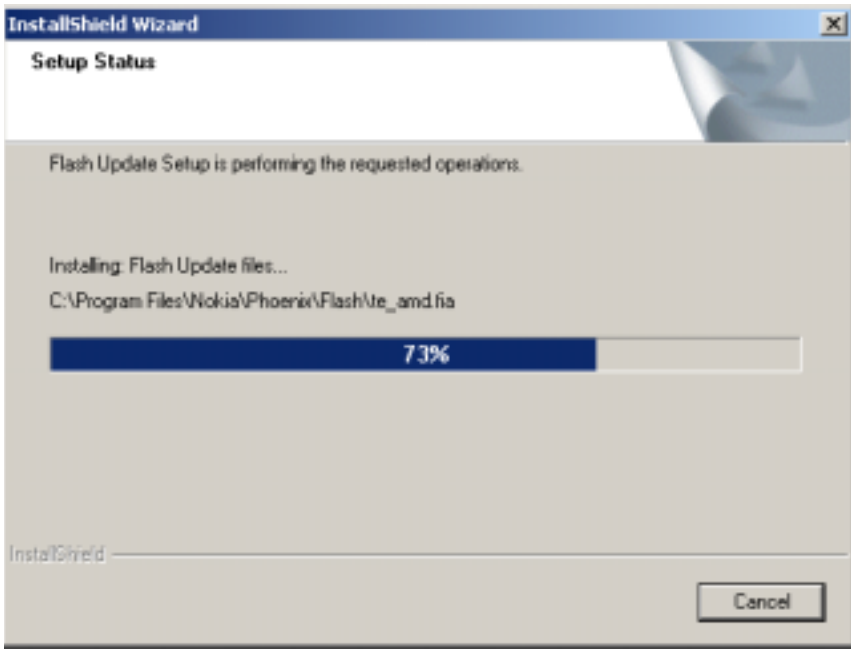
It is **highly** recommended to install the files to the default destination folder *C:\Program Files\Nokia\Phoenix*. Choose “Next” to continue. When installing the flash update files for the first time you may choose another location by selecting “Browse” (not recommended).


InstallShield Wizard
Choose Destination Location
Select folder where Setup will install files.
Setup will install Flash Update in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\Nokia\Phoenix
Browse...
InstallShield
< Back
Next >
Cancel

The installation continues.



Choose “Finish” to complete the procedure.

FLS-4 can be used right after Flash Update Package is installed.

FPS-8* flash prommer must be updated by using Phoenix!

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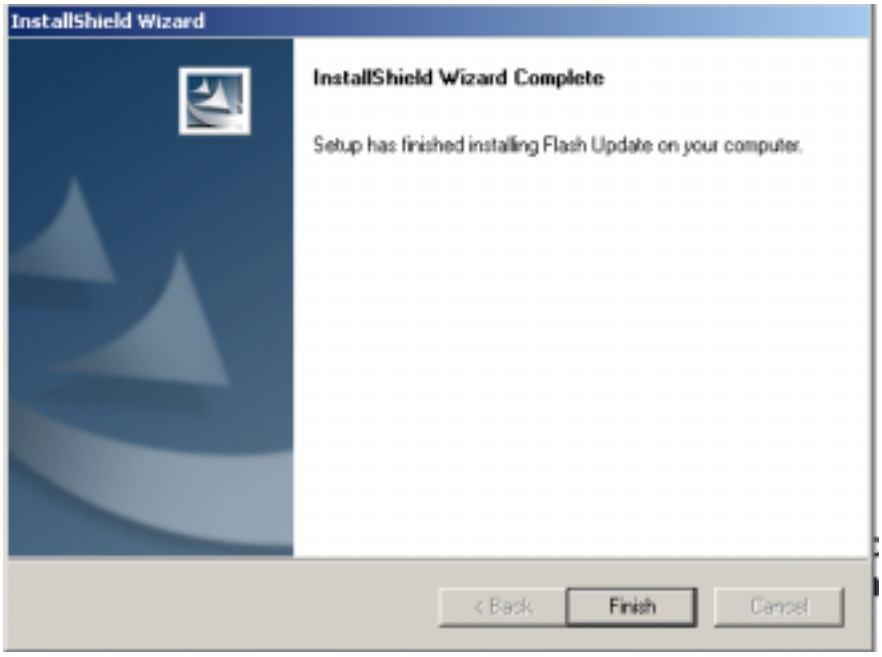
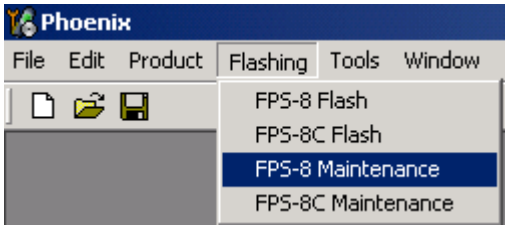


Updating the FPS-8* Flash Prommer SW

Start Phoenix Service Software and login, manage connection correctly for the FPS-8* flash prommer.

Select ”FPS-8 maintenance” from ”Flashing” menu.



When new FPS-8 flash update package is installed to computer you will be asked to update the files to your FPS-8 Prommer.

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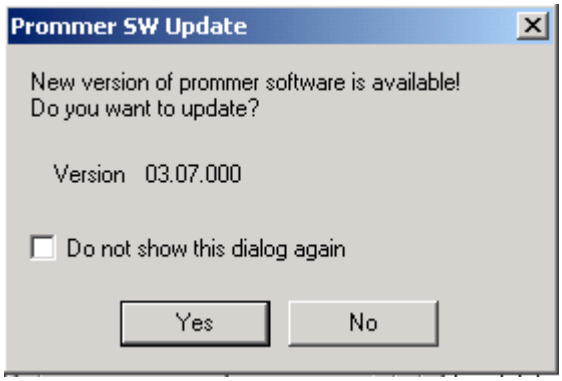
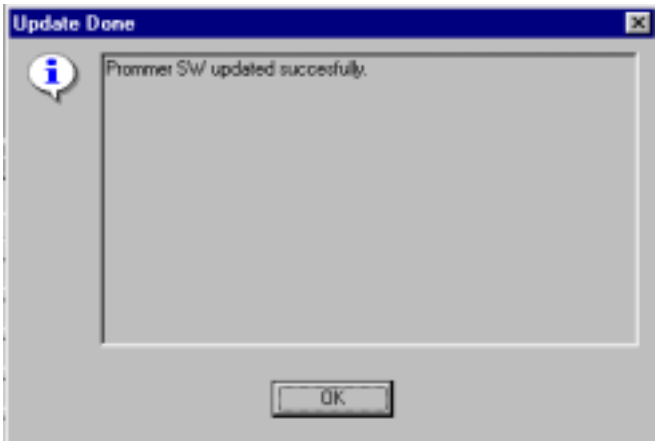
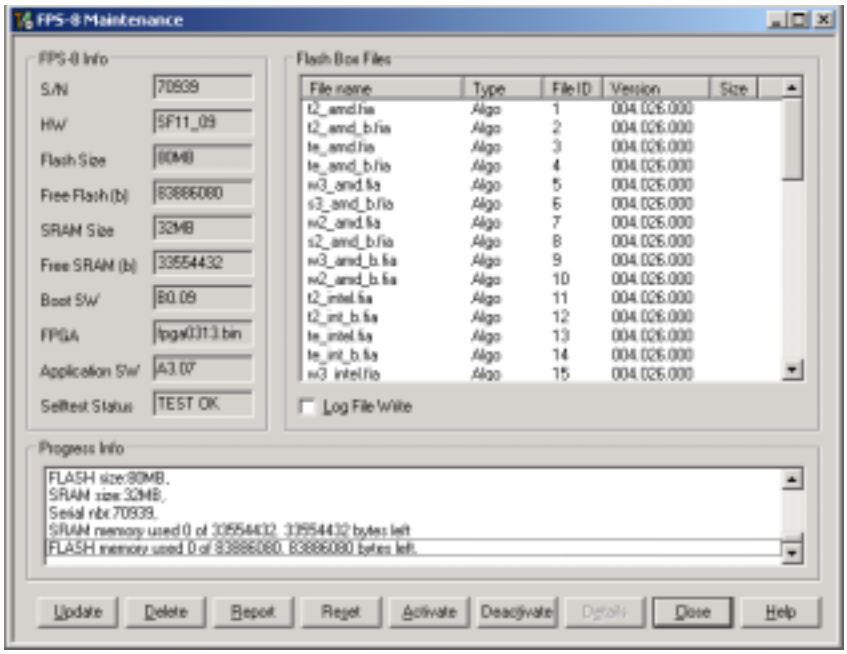
Select ”Yes” to update files.



The update procedure takes a couple of minutes, please wait until you are notified that update has been successful. Choose “OK” and close “FPS8 Maintenance” UI.



View after a successful prommer software update.



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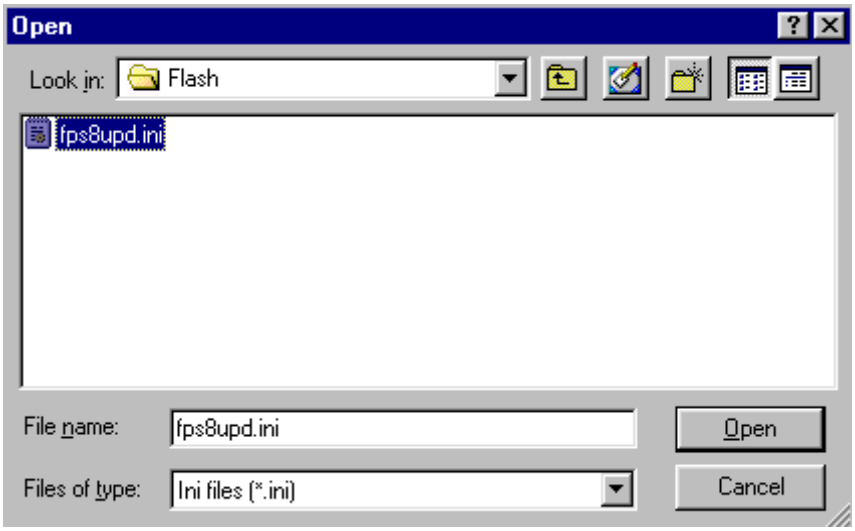
FPS-8 sw can also be updated by pressing ”Update” and selecting appropriate **fps8upd.ini** file under *C:\Program Files\Nokia\Phoenix***Flash**.



All files can be loaded separately to FPS-8. To do this, just press the right mouse button in the ”Flash box files” window and select file type to be loaded.

More information and help can be found from “Help” dialog.

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Activating and Deactivating FPS-8

- Before the FPS-8 can be successfully used for phone programming, it must be first activated.
- If there is a need to send FPS-8 box to somewhere e.g. for repair, box must be first deactivated.

Activation

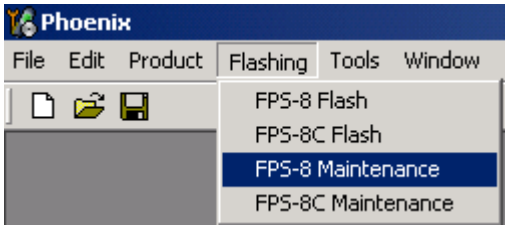
Before FPS-8 can be successfully used for phone programming, it must be first activated.

First, fill in the “FPS-8 activation request” sheet, in the FPS-8 sales package and follow the instructions in the sheet.

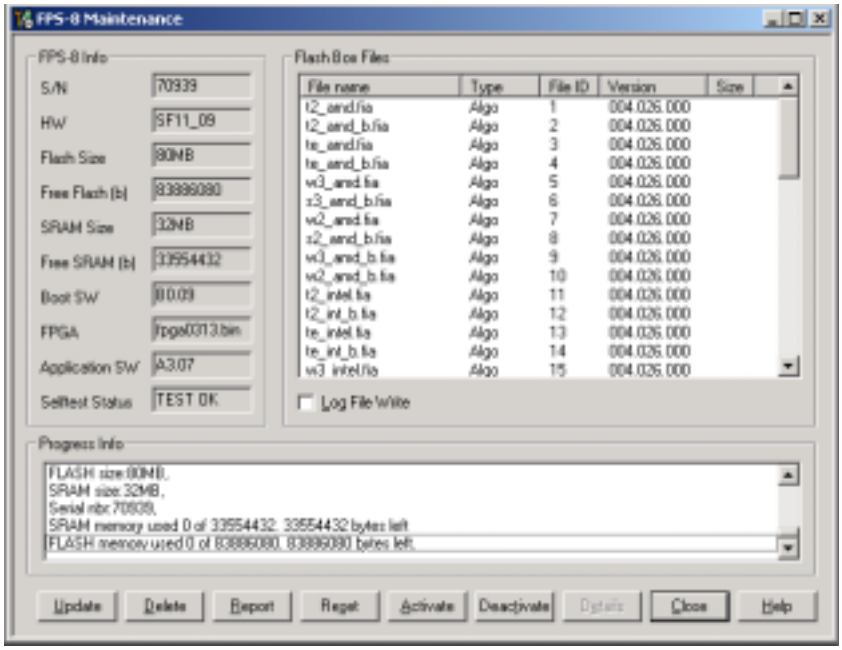
When activation file is received (e.g. 00000.in), copy it to *C:\ProgramFiles\Nokia\Phoenix\Box-Activation* directory on your computer (this directory is created when Phoenix is installed).

Start Phoenix Service Software.

Select ”FPS-8 maintenance” from ”Flashing” menu.



Select “Activate” from the “FPS8 Maintenance” UI. The box will be activated when you choose “**Activate**”.



If you want to save the activation file to another directory on your PC, please browse to find it.

The box will be activated when you choose “**Open**”.

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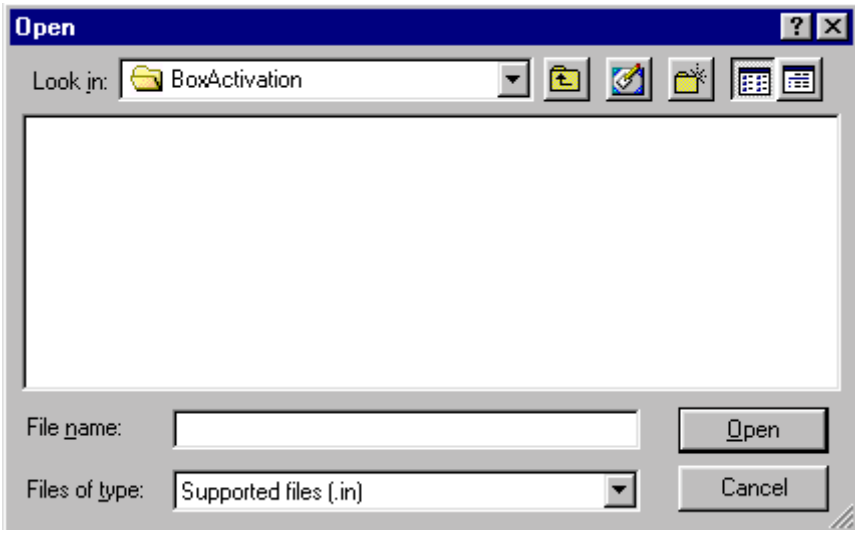


Turn FPS-8 power off and on to complete the activation.

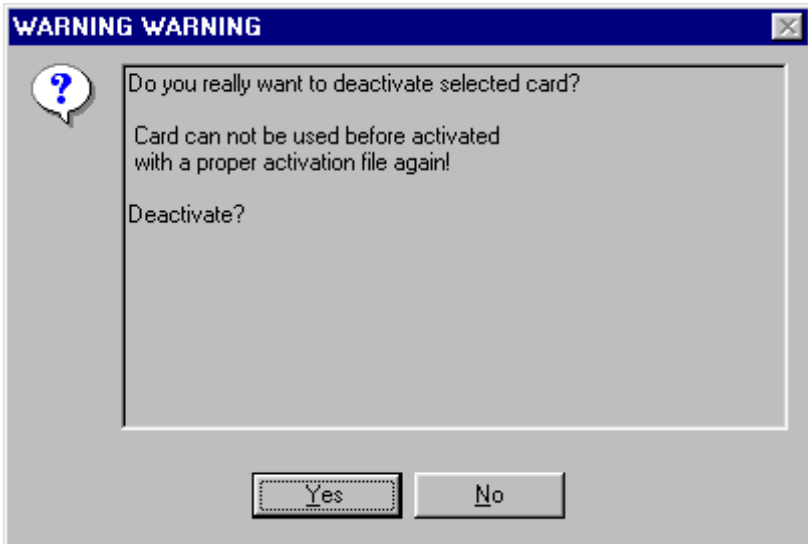
Deactivation

Start Phoenix Service Software.

Select ”FPS-8 maintenance from the ”Flashing” menu as when activating prommer or updating sw.

Select “**Deactivate**” from the “FPS8 Maintenance” UI.

Confirm Deactivation by choosing “Yes”. The box will be deactivated.



Turn FPS-8 power off and on to complete deactivation.

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JBV-1 Docking Station SW

The JBV-1 Docking Station is a common tool for all DCT-4 generation products.

In order to make the JBV-1 usable with different phone models, a phone specific Docking Station Adapter is used for different service functions.

The JBV-1 Docking Station contains Software (Firmware) which can be updated.

You need the following equipment to be able to update JBV-1 software:

- PC with USB connection
- operating System supporting USB (Not Win 95 or NT)
- USB Cable (Can be purchased from shops or suppliers providing PC hardware and accessories)
- JBV-1 Docking Station
- external Power Supply 11-16V

Before installation

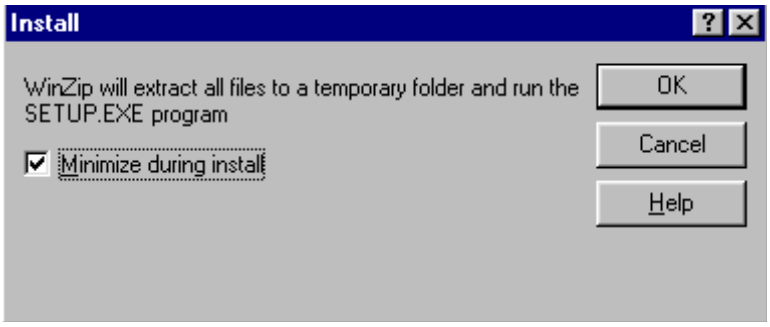
- Download *Jbv1_18_update.zip* – file to your computer (e.g. C:\TEMP) from your download web site.
- Close all other programs.
- Follow the instructions on the screen.

Installing SW needed for the JBV-1 SW update

Note: DO NOT CONNECT THE USB CABLE / JBV-1 TO YOUR COMPUTER YET!

Run Jbv1_18_update.zip file and start the SW installation by double clicking Setup.exe.

Files needed for JBV-1 Package setup program will be extracted.



The installation begins, please read the information shown and choose “Next” to continue.

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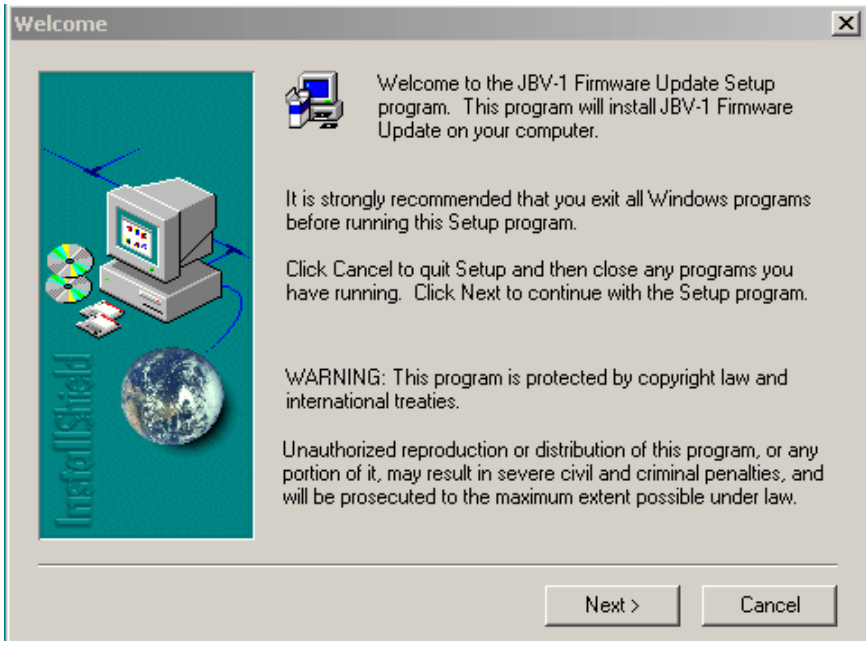
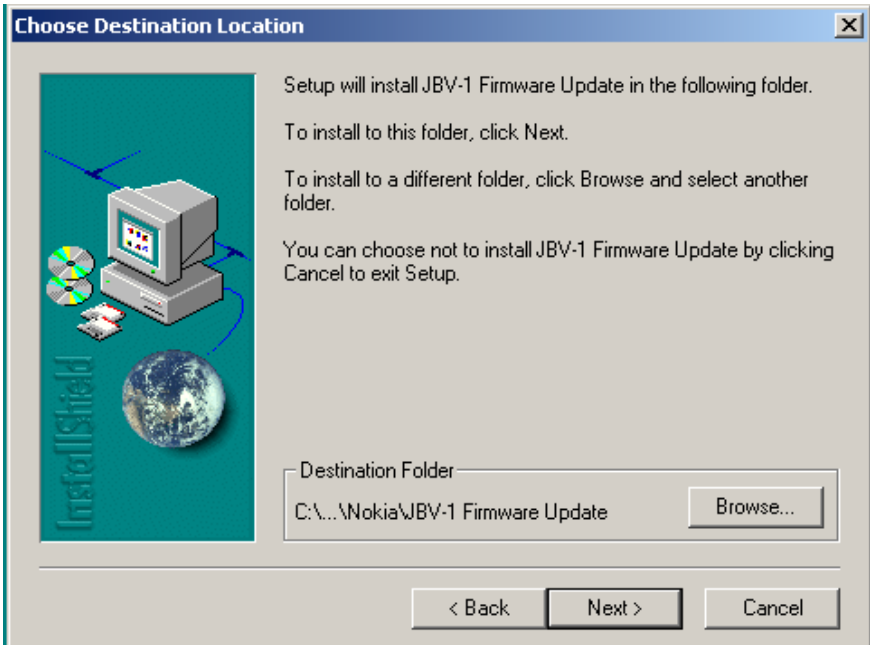

Welcome
Welcome to the JBV-1 Firmware Update Setup program. This program will install JBV-1 Firmware Update on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup program.
Click Cancel to quit Setup and then close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
InstallShield
Next >
Cancel

Use suggested destination folder where JBV-1 SW Package will be installed and choose “Next” to continue.


Choose Destination Location
Setup will install JBV-1 Firmware Update in the following folder.
To install to this folder, click Next.
To install to a different folder, click Browse and select another folder.
You can choose not to install JBV-1 Firmware Update by clicking Cancel to exit Setup.
Destination Folder
C:\...\Nokia\JBV-1 Firmware Update
Browse...
InstallShield
< Back
Next >
Cancel

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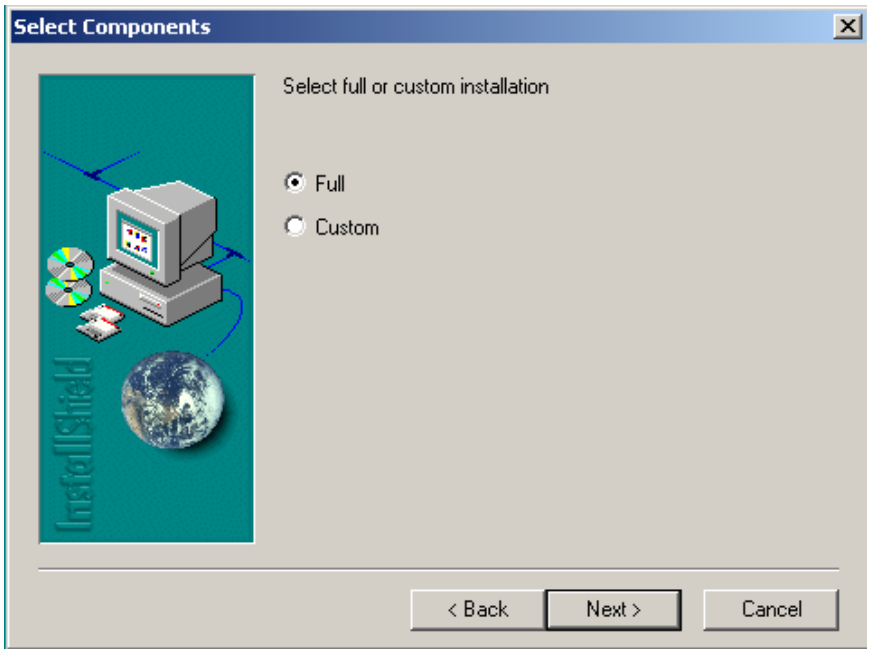
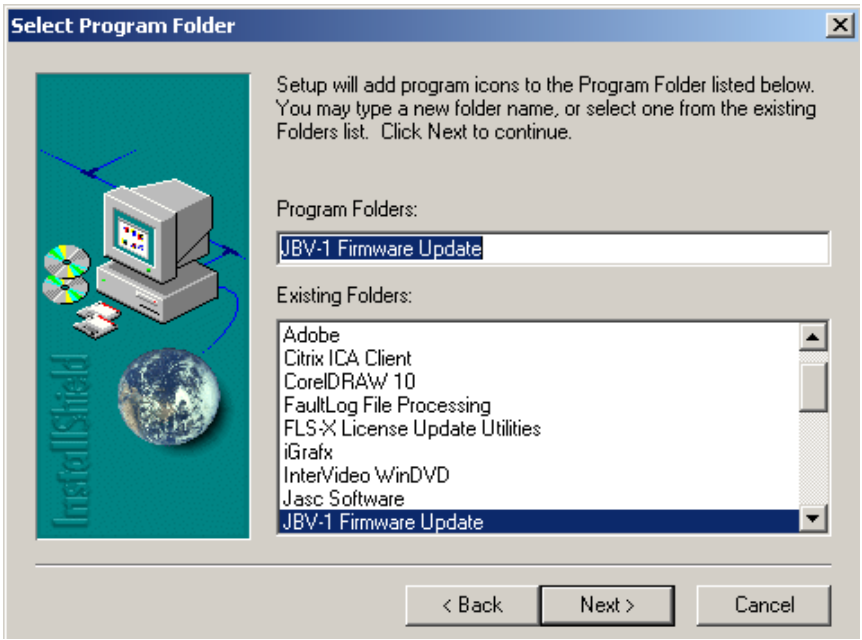
Select “Full” installation and choose “Next” to continue.



Program Folder will be created. Choose “Next” to continue, Software files will be installed.



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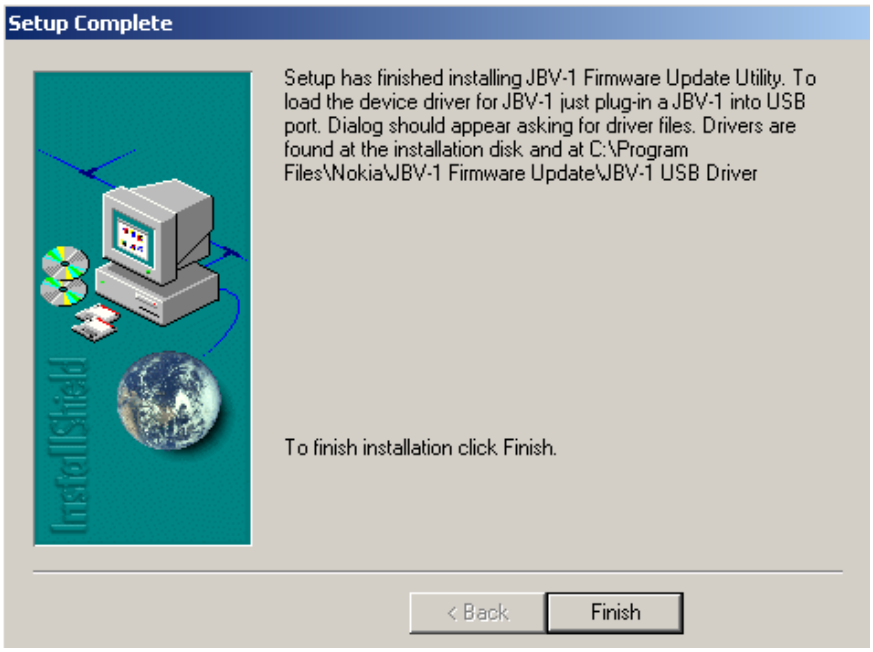
After successful installation, choose “Finish” to complete.


Setup Complete
Setup has finished installing JBV-1 Firmware Update Utility. To load the device driver for JBV-1 just plug-in a JBV-1 into USB port. Dialog should appear asking for driver files. Drivers are found at the installation disk and at C:\Program Files\Nokia\JBV-1 Firmware Update\JBV-1 USB Driver
To finish installation click Finish.
InstallShield
< Back
Finish

YOU CAN NOW CONNECT THE USB CABLE / JBV-1 TO YOUR COMPUTER

Connect power to JBV-1 (11-16V DC) from an external power supply, then connect USB Cable between JBV-1 USB connector and PC.

The next step is to install or update the JBV-1 USB drivers which are delivered with the JBV-1 SW installation package. They can be found in folder:

C:\Program Files\Nokia\ JBV-1 Firmware Update\JBV-1USB driver

If there is no previously installed JBV-1 Firmware update package installed on your computer, Windows will detect the connected USB cable and detect drivers for new HW. You will be prompted about this, please follow the instructions and allow Windows to search and install the best Drivers available.

If there is a previously installed JBV-1 Firmware update package (v 17 or older) on your computer, please update the JBV-1 USB Driver. *Please see the readme.txt* file under C:\Program Files\Nokia\ JBV-1 Firmware Update\JBV-1USB driver folder for instructions on how to update the JBV-1 USB Driver.

After you have installed or updated the JBV-1 USB driver, the actual JBV-1 SW update can begin.

Go to folder *C:\Program Files\Nokia\JBV-1 Firmware Update\JBV-1 Firmware Update* and start JBV-1 Update SW by double clicking **fwup.exe**.

JBV-1 Firmware update starts and shows current status of the JBV-1 connected.

If the firmware version read from your JBV-1 is not the latest one available (v. 17 or older), it needs to be updated to version 18 by choosing “Update Firmware”.

If you simply want to check the SW version, choose “Refresh Status”.

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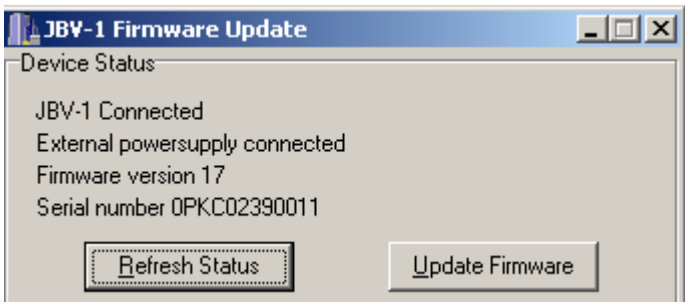
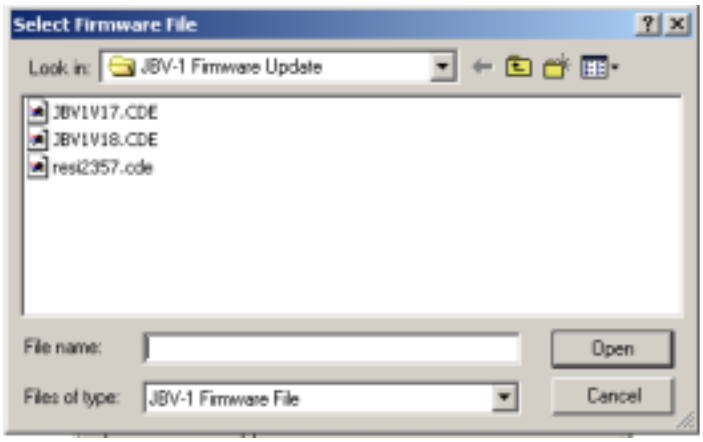


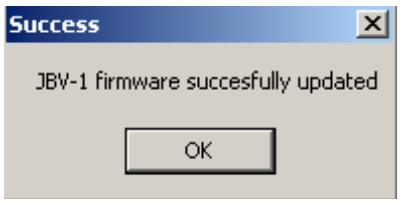
To update your JBV-1 to a new version, 18 choose file *JBV1v18.CDE* and “Open”.

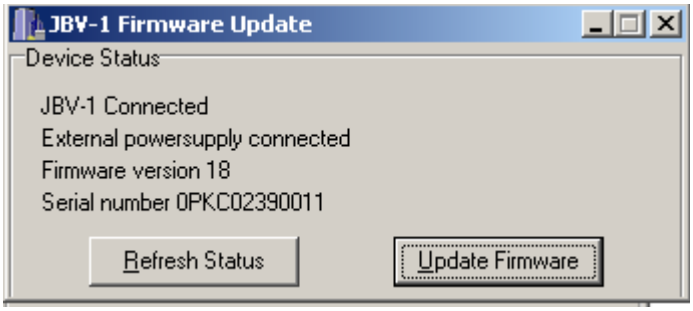
Please wait, it takes a while until you can hear a “**click**” from the JBV-1.

The older sw file JBV1v17.CDE is visible in this view only if the previous JBV-1 SW package has been installed on your computer.



After a successful update, the current JBV-1 status will be shown after you choose “OK”.





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You have now updated the software of your JBV-1 docking station and it is ready for use.

If you have several docking stations you need to update, disconnect the Power & USB cables from the previous one and connect them to the next docking station. Choose “Refresh Status” to see the current SW version and then “Update Firmware” to update the SW.

After you have updated all docking stations, close the “JBV-1 Firmware Update” dialog.

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Quick Guide for Phoenix Service SW Installation

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Phoenix Installation Steps in Brief

DCT-4 generation Test and Service Software is called “Phoenix”.

These are the basic steps to install the Phoenix:

- Connect a DK2 Dongle or FLS-4S POS Flash Device.
- Install the Phoenix Service SW.
- Install the Data Package for Phoenix.
- Configure users.
- Manage connection settings (depends on the tools you are using).

Phoenix is now ready for FLS-4S Point Of Sales Flash Device use.

If you use FPS-8:

- Update FPS-8 SW.
- Activate FPS-8.
- Update JBV-1 Docking Station SW (only when needed).

Phoenix is now ready to be used also with FPS-8 flash prommer and other tools.

The Phoenix Service Software installation contains:

- Service software support for all phone models included in the package
- Flash update package files for FPS-8* and FLS-4S programming devices
- All needed drivers for:
  DK2 dongle
  FLS-4S point of sales flash device
  USB devices

Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless updates appear between Phoenix Service SW releases. If separate update packages are used, they should be used after Phoenix and data packages have been installed.

The phone model specific data package includes all changing product specific data:

- product software Binary files
- files for type label printing
- validation file for the Faultlog repair data reporting system
- all product specific configuration files for Phoenix software components

Please refer to Service Manual and Technical Bulletins for more information concerning phone model specific service tools and equipment setup.

Phoenix Service SW and phone data packages should only be used as complete installation packages. Uninstallation should be made from Windows Control Panel.

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Phoenix Service SW

Before installation

- Check that a dongle is attached to the parallel port of your computer.
- Download the installation package (e.g. *phoenix_service_sw_a12_2003_50_6_35.exe*) to your computer (e.g. C:\TEMP).
- Close all other programs.
- Run the application file (e.g. *phoenix_service_sw_a12_2003_50_6_35.exe*) and follow instructions on the screen.

Administrator rights may be required to be able to install Phoenix depending on the Operating System.

If uninstalling or rebooting is needed at any point, you will be prompted by the Install Shield program.

If at any point during the installation you get this message, the dongle is not found and the installation can not continue.

Possible reasons may be defective or too old PKD-1Dongle (five digit serial number dongle when used with FPS-8 Prommer) or that the **FLS-4S** POS Flash Dongle is defective or power to it is not supplied by external charger.

First, check the COM /parallel ports used! After correcting the problem, the installation can be restarted.

Dongle not found
Insert Nokia dongle and click Retry to re-detect the dongle or click Cancel to exit the installation.
Retry
Cancel

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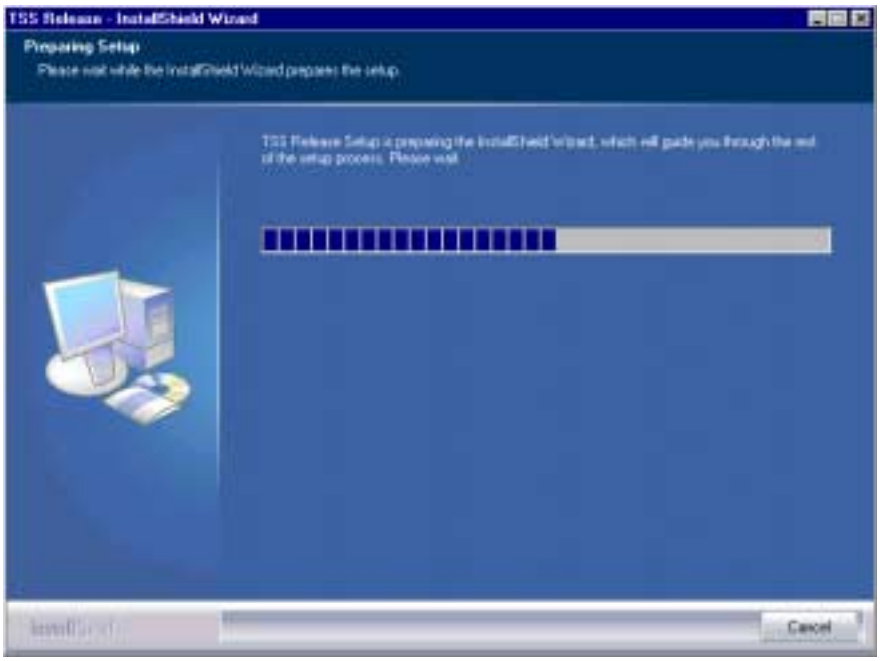
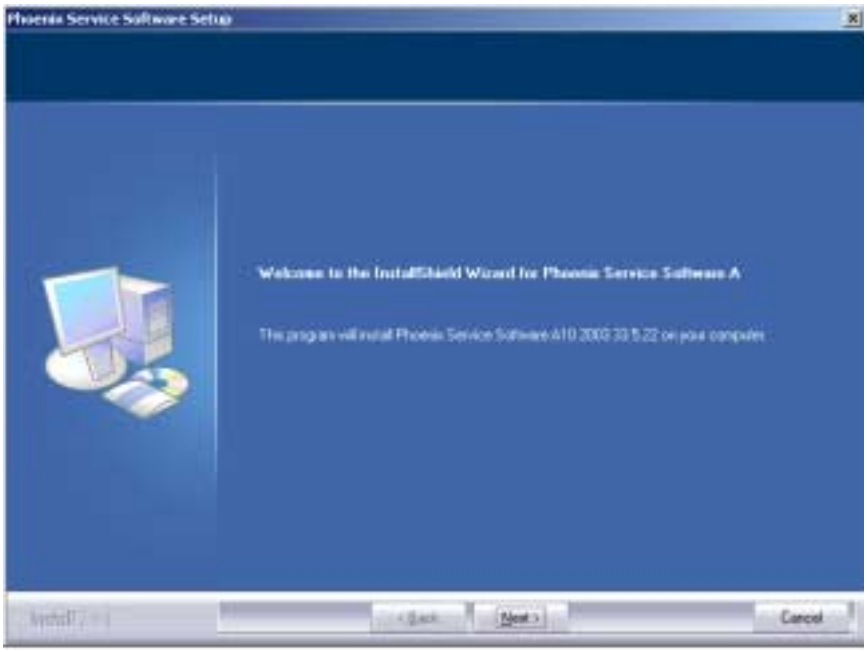
Installing Phoenix

Run the *phoenix_service_sw_a12_2003_50_6_35.exe* to start the installation. Install Shield will prepare.


TSS Release - InstallShield Wizard
Preparing Setup
Please wait while the InstallShield Wizard prepares the setup.
Cancel

Click "Next" in Welcome dialog to continue.



Choose the destination folder, it is recommended to use the default folder *C:\Program-Files\Nokia\Phoenix*.

Choose “Next” to continue. You may choose another location by selecting “Browse” (not recommended).

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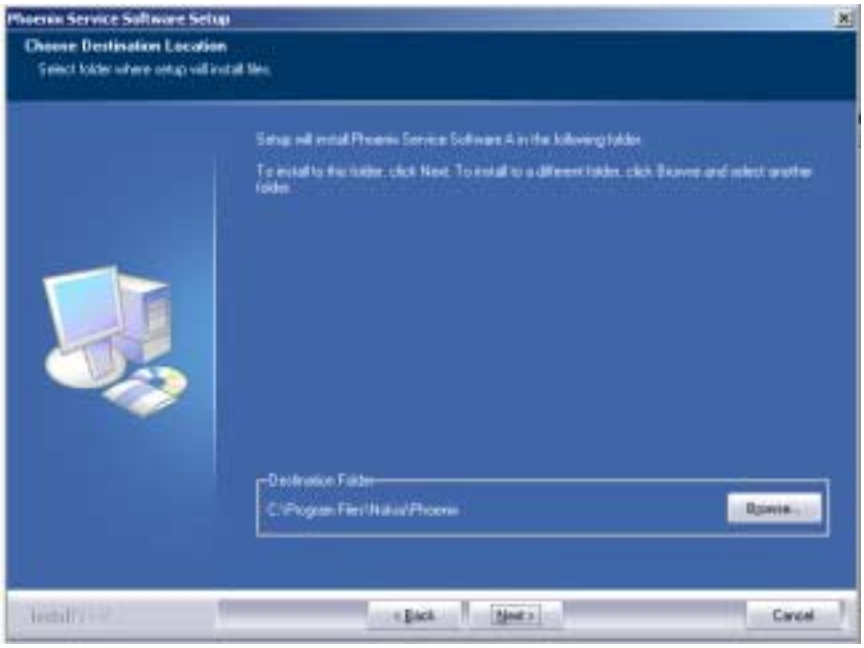
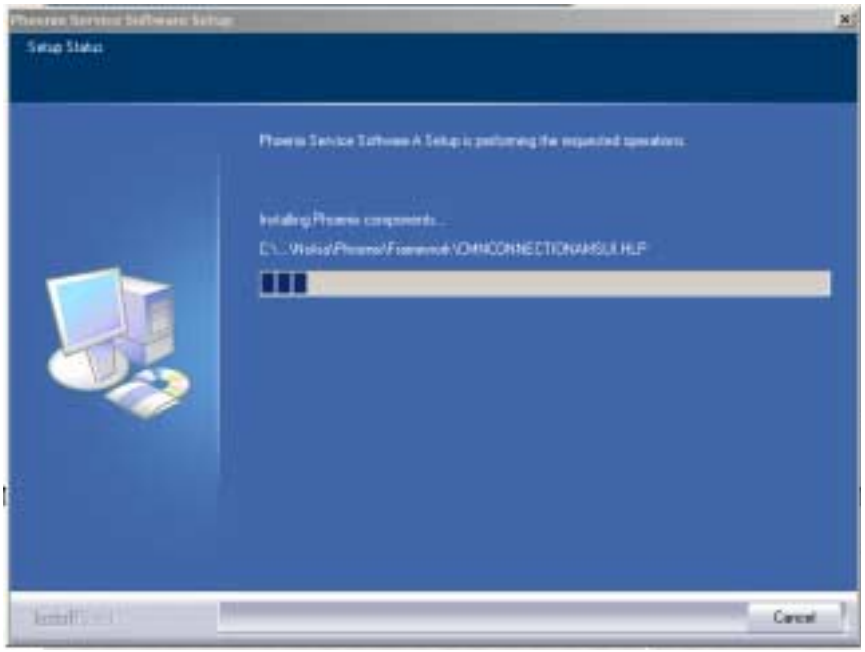

Phoenix Service Software Setup
Choose Destination Location
Select folder where setup will install files.
Setup will install Phoenix Service Software A in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\Program Files\Nokia\Phoenix
Browse...
< Back
Next >
Cancel

Setup copies the components, progress of the setup is shown. Please wait.


Setup Status
Phoenix Service Software A Setup is performing the requested operations.
Installing Phoenix components...
Cancel

Drivers will be installed and updated, please wait. The process may take several minutes to complete.

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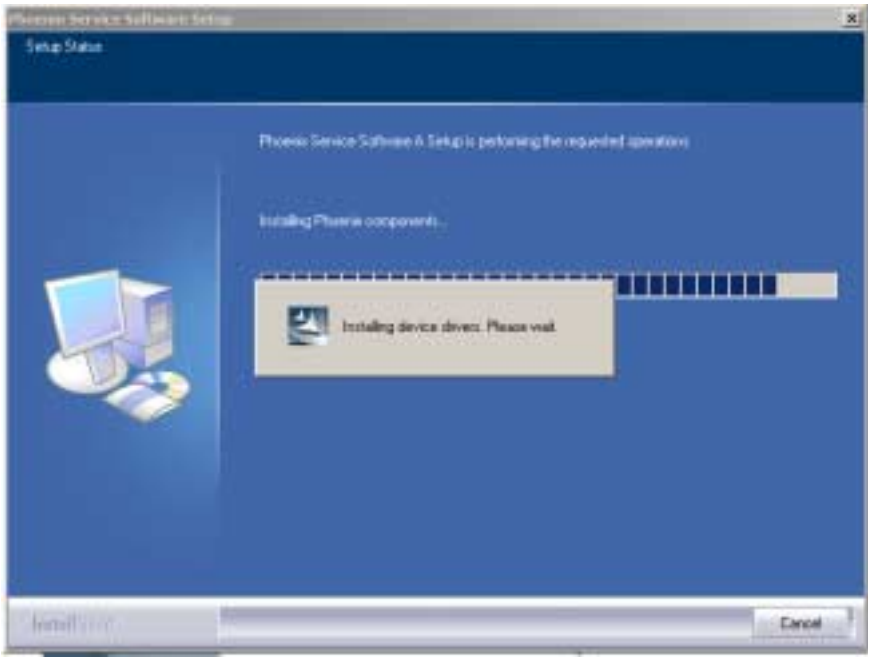
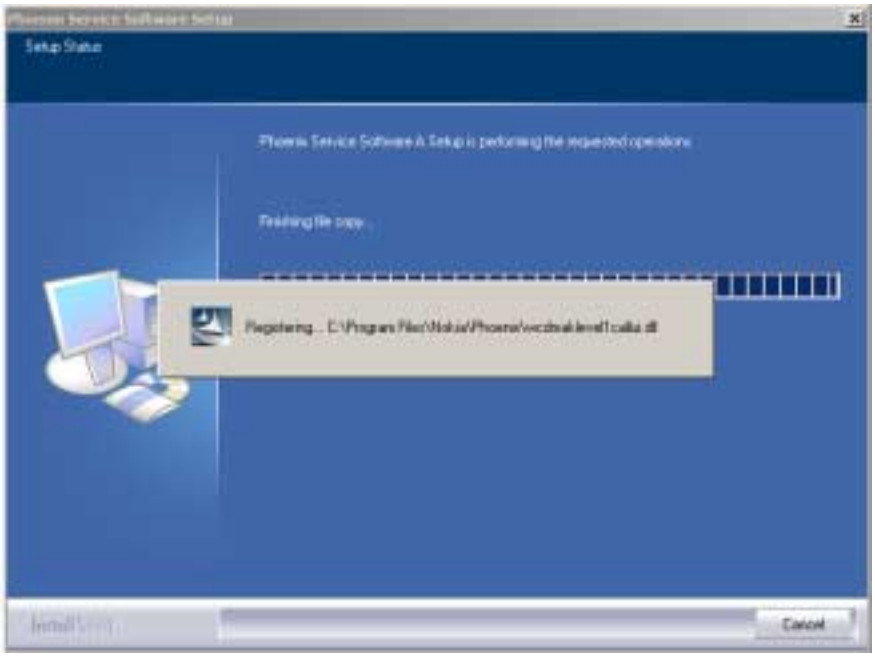


If the operating system does not require rebooting (Windows 2000, XP) the PC components are registered right away.



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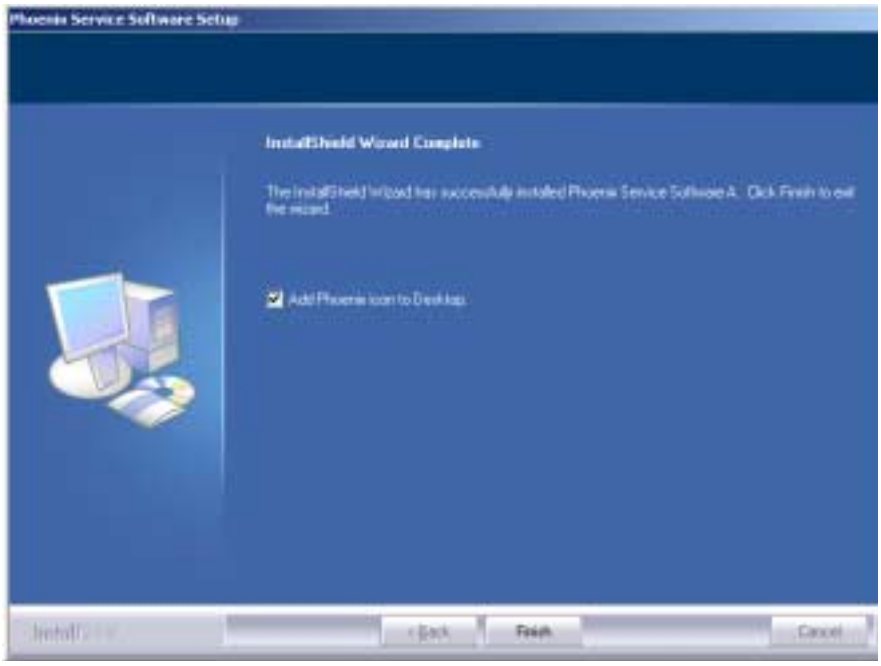
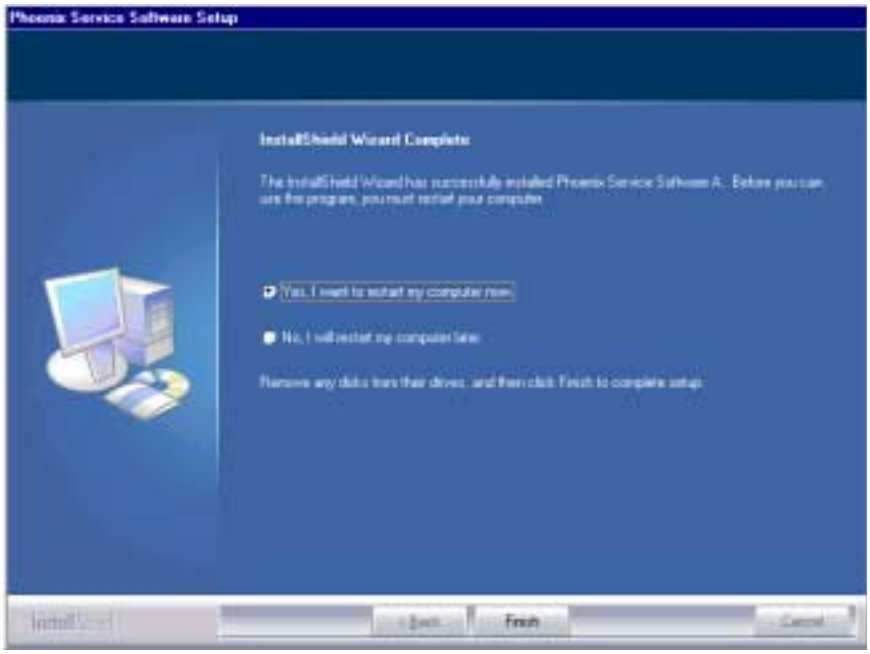
Click "Finish" to finalize. Phoenix is ready for use.



If the operating system used requires restarting your computer (Windows 98, SE, ME), the Install Shield Wizard will notify you about it. Select "Yes..." to reboot the PC immediately and "No..." to reboot the PC manually afterwards.


Phoenix Service Software Setup
InstallShield Wizard Complete
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
Back
Finish
Cancel

After the reboot components are registered and Phoenix is ready for use. Note that Phoenix doesn't work, if components are not registered.

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Now the installation of Phoenix Service SW is ready and it can be used after :

- installing Phone model specific Phone Data Package for Phoenix
- configuring users and connections

FLS-4S can be used right away.

FPS-8* can be used after updating Flash Update Package files to it.

Updating Phoenix installation

If you already have the Phoenix Service SW installed on your computer, sooner or later there will be need to update it when new versions are released.

Always use the latest available versions of both the Phoenix Service SW and the Phone Specific Data Package. Instructions can be found in phone model specific Technical Bulletins and Phone Data package readme.txt files (shown during installation).

To update Phoenix, you need to take exactly the same steps as when installing it for the first time.

- Download the installation package to your computer hard disk.
- Close all other programs.
- Run the application file (e.g. *phoenix_service_sw_a12_2003_50_6_35.exe*).

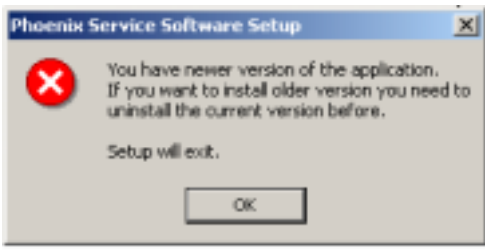
Newer version of Phoenix will be installed.

Driver versions will be checked and if need be, updated.

When you update Phoenix from an old to a new version (e.g. *a11_2003_41_5_28* to *a12_2003_50_6_35*), the update will take place automatically without uninstallation.

If you try to update Phoenix with the same version that you already have (e.g. *a12_2003_50_6_35* to *a12_2003_50_6_35*) you are asked if you want to uninstall the version of Phoenix you have on your PC. In this case, you can choose between total uninstallation and repair just like when you choose to uninstall Phoenix service software from the Windows control panel.

If you try to install an older version (e.g. downgrade from *a12_2003_50_6_35* to *a11_2003_41_5_28* installation will be interrupted.


Phoenix Service Software Setup
You have newer version of the application.
If you want to install older version you need to uninstall the current version before.
Setup will exit.
OK

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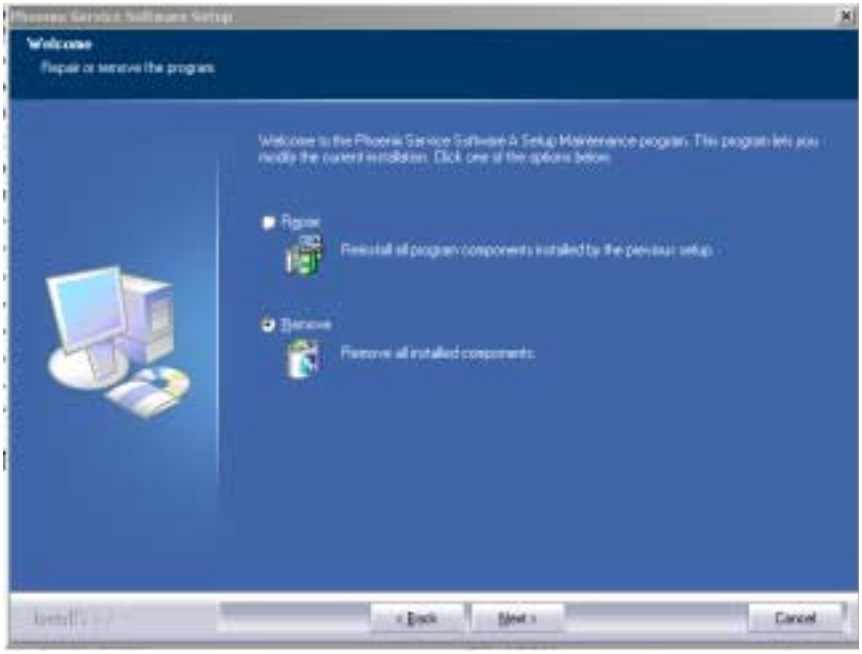
Please always follow the instructions on the screen.

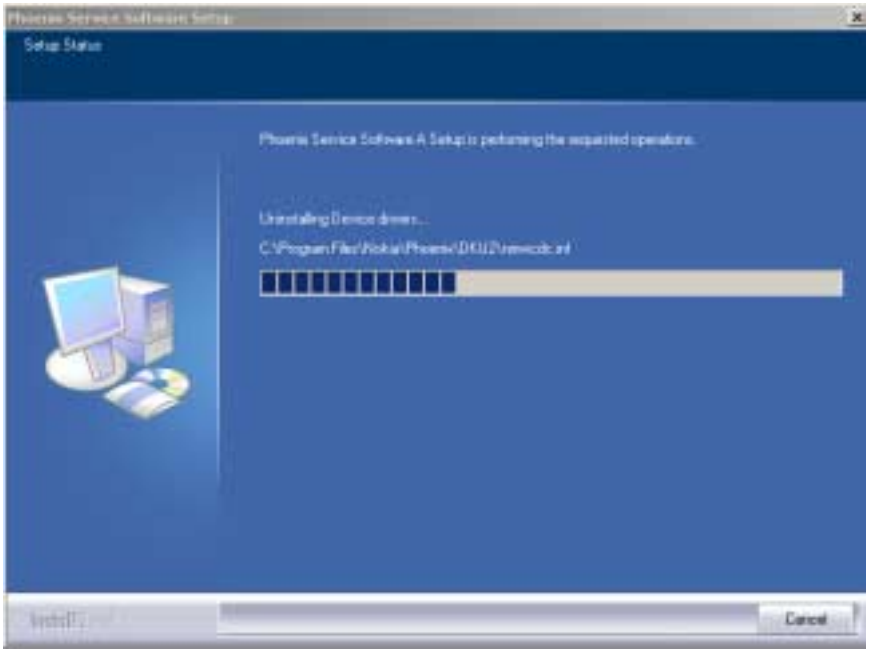
Uninstalling Phoenix

Uninstallation can be done manually from Windows Control Panel - Add / Remove Programs.

Choose “Phoenix Service Software” and click "Add/Remove". Choose “Remove” to uninstall Phoenix.



Progress of the uninstallation is shown.



If the operating system does not require rebooting, select “Finish” to complete.

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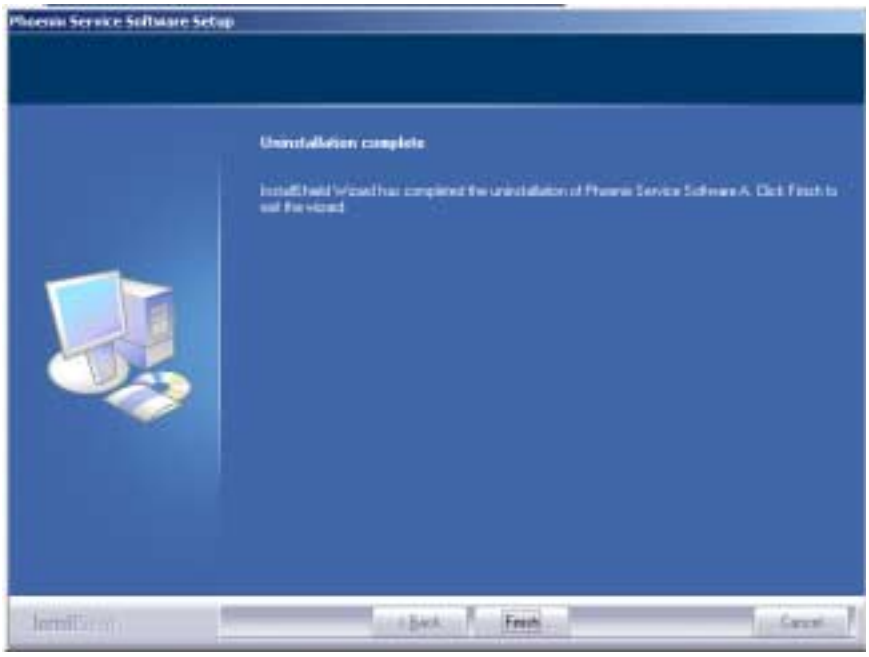
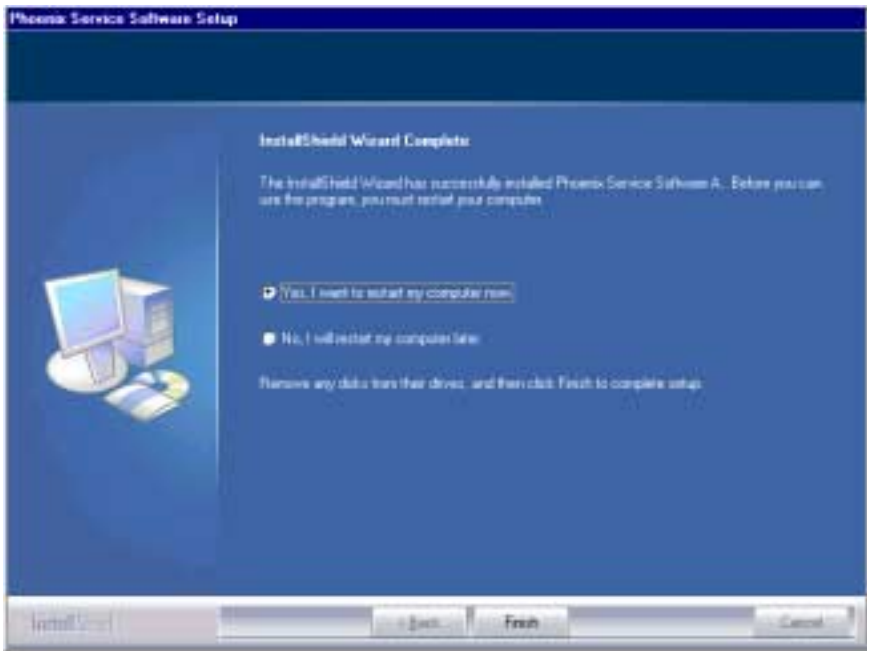

Phoenix Service Software Setup
Uninstallation complete
InstallShield Wizard has completed the uninstallation of Phoenix Service Software A. Click Finish to exit the wizard.
< Back
Finish
Cancel

If the operating system used requires rebooting, Install Shield Wizard will notify you about it. Select "Yes..." to reboot the PC immediately and "No..." to reboot the PC manually afterwards.


Phoenix Service Software Setup
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed Phoenix Service Software A. Before you can use the program, you must restart your computer.
Yes, I want to restart my computer now.
No, I will restart my computer later.
Remove any disks from their drives, and then click Finish to complete setup.
< Back
Finish
Cancel

Repair

If you experience any problems with the service software or suspect that files have been lost, you can use the repair function before completely reinstalling Phoenix. Note that the original installation package (e.g. *phoenix_service_sw_a12_2003_50_6_35.exe*) must be found on your PC when you run the repair setup.

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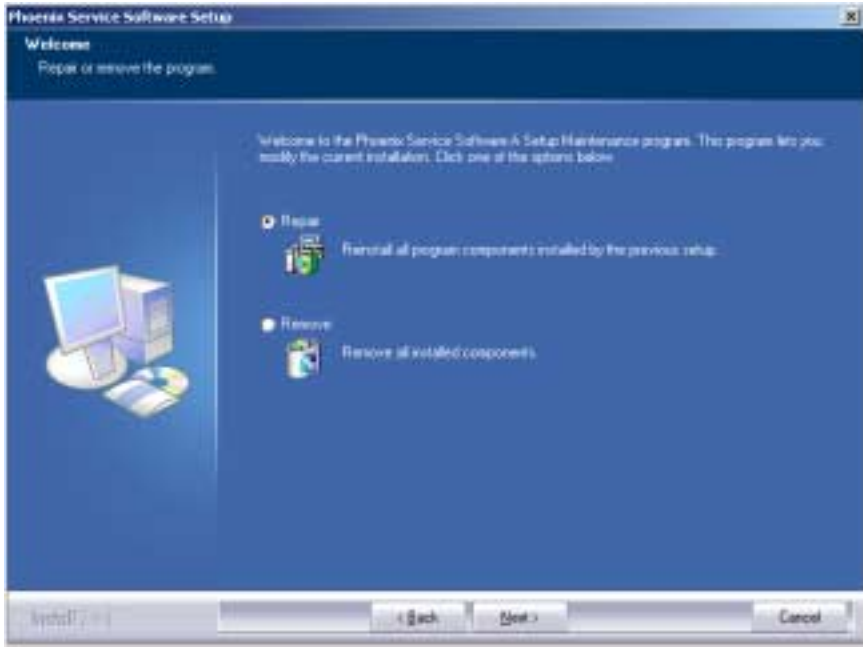
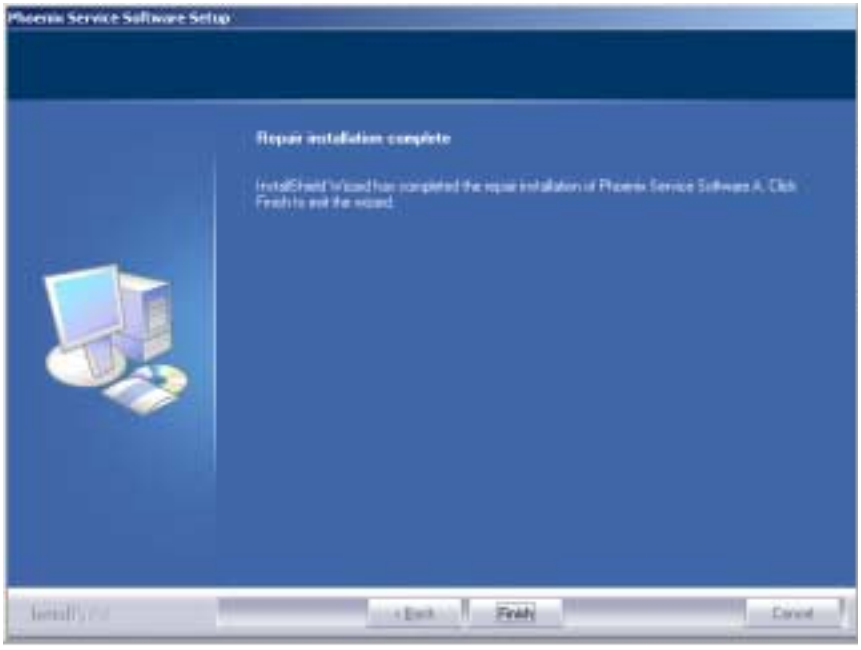
Run Windows Control Panel - Add / Remove Programs, choose “Phoenix Service Software” and click "Add/Remove". In the following view choose “Repair”.



Phoenix will reinstall components and register them, the procedure is the same as in the update installation.

Choose “Finish” to complete.



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Receiver Tuning:
Quick Guide for Tuning with Phoenix

RF tunings should be made in the same order as shown in this document. The order of the corresponding menu items in the Phoenix Service SW may be different.

If baseband tunings are needed, they should be made before the RF tunings.

Avoid unnecessary tuning – factory tuning values are always the most accurate ones.

Views in this document may change as the service software is developed. Please refer to the Phoenix help files, phone model specific service manual and bulletins for help.

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Service Tool Concept for RM-72* Baseband Tunings

EM calibrations should be carried out in JBV-1 Docking Station equipped with DA-8 Docking Station Adapter

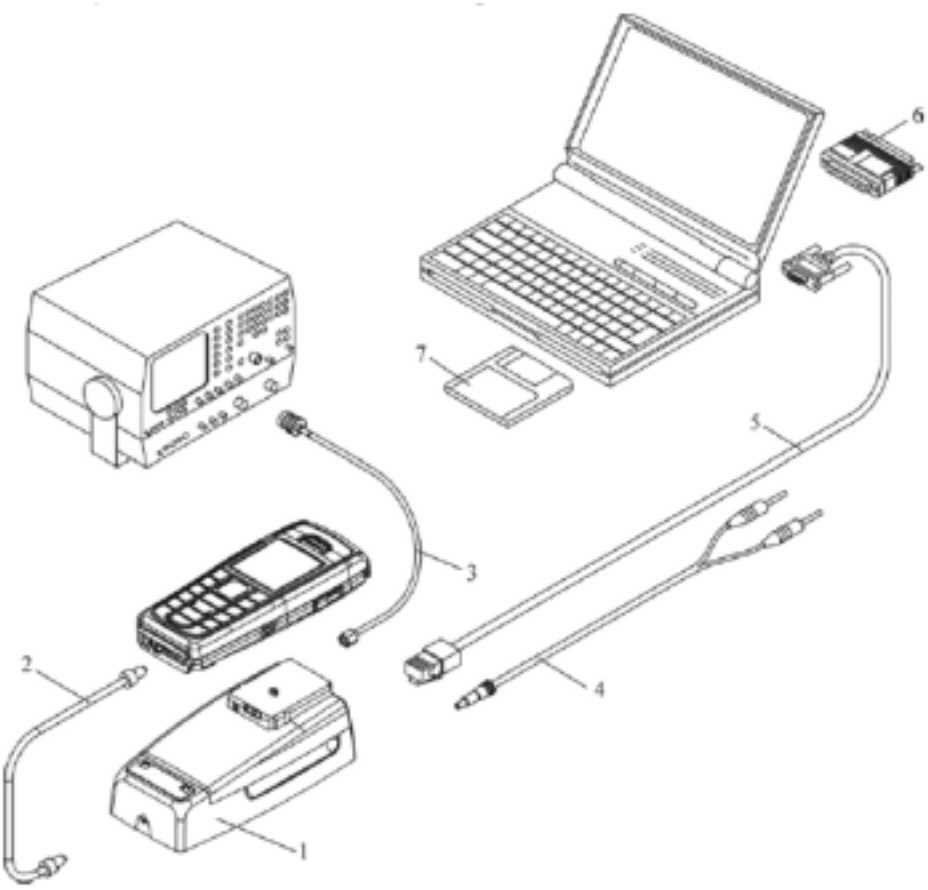
Note: RF tunings must be carried out in MJ-12 module jig.

Power to JBV-1 should be supplied from an external DC power supply, not FPS-8 prommer

JBV-1 input voltages:

- Maximum + 16 VDC
- Nominal input for RF tunings is +12 V DC

Service concept for RM-72* baseband tunings



Item	Service Accessory	Accessory type	Product code
1	Docking Station	JBV-1	0770298
2	Docking Station adapter	DA-8	0770546
4	DC-DC Cable	SCB-3	0730114

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Item	Service Accessory	Accessory type	Product code
5	RF antenna cable	XRF-1	0730085
6	DC power cable	PCS-1	0730012
7	Service MBUS cable	DAU-9S	0730108
8	Software protection key	PKD-1	0750018
9	Phoenix service SW		8408031
9	Phoenix service SW	CD-ROM	0774286

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Baseband Tunings

Energy management tuning

External power supply is needed.

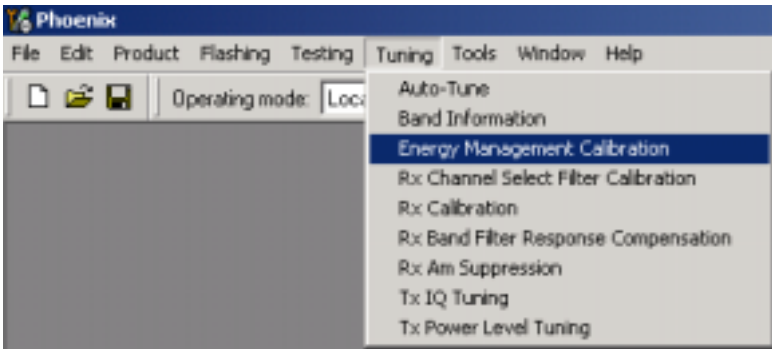
EM Calibration is used for calibrating Battery and Charger settings of the phone.

Preparation for EM Calibration:

- Connect DC Cable SCB-3 between JBV-1 and Vin of Phone for Charger calibration.
- Connect 12…15 V from Power Supply to JBV-1.

NOTE! Check that connection is F-BUS (doesn't work with M-BUS!).

Select **Tuning => Energy Management Calibration**



Energy Management values to be calibrated are checked.

Select "**Read from Phone**" to show current values in the phone memory and to check that the communication with the phone works.

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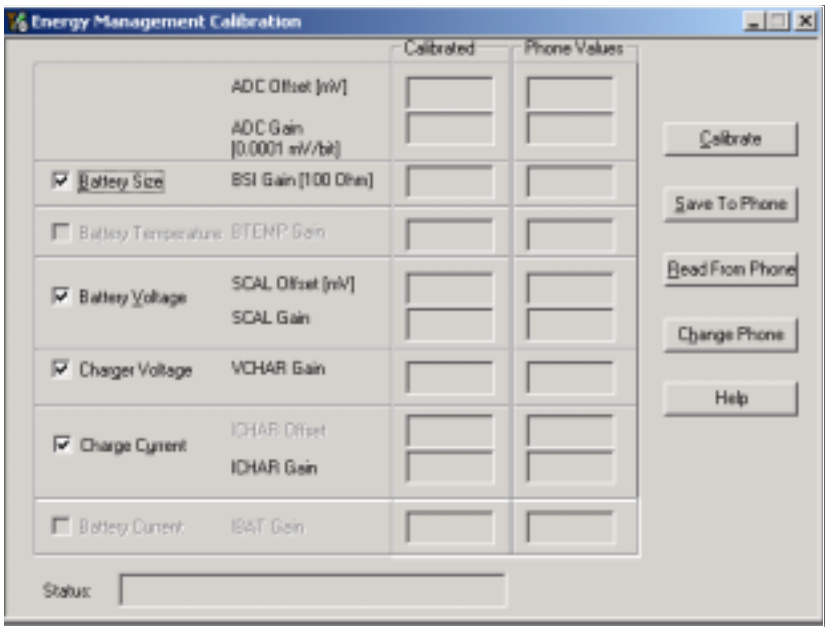
Select “**Calibrate**” to run selected calibrations.



Limits for Energy Management Calibration:

	Min	**Max**
ADC gain	27000	28000
ADC offset	-50	50
BSI gain	930	1100
VBAT gain	10000	11000
VBAT offset	2400	2600
VCHAR	58000	62000
ICHAR	3500	4600

If values shown are within limits, select “**Save To Phone**” to save values to phone.

NOTE! Only values of checked tunings (Battery size, Battery Temperature etc…) will be saved.

Close the “**Energy Management Calibration**” dialog to end tuning.

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Service Tool Concept for RF Tunings

All RF tunings for RM-72* phones must be carried out in MJ-12 Module Jig.

Power to MJ-12 should be supplied from an external DC power supply, not FPS-8 prommer.

MJ-12 input voltages:

- Maximum + 16 VDC
- Nominal input for RF tunings is +12 V DC

Remember cable attenuation when setting required RF levels.

RF tunings should be made in the same order as shown in this document, the order of the corresponding menu items in the Phoenix Service SW may be different.

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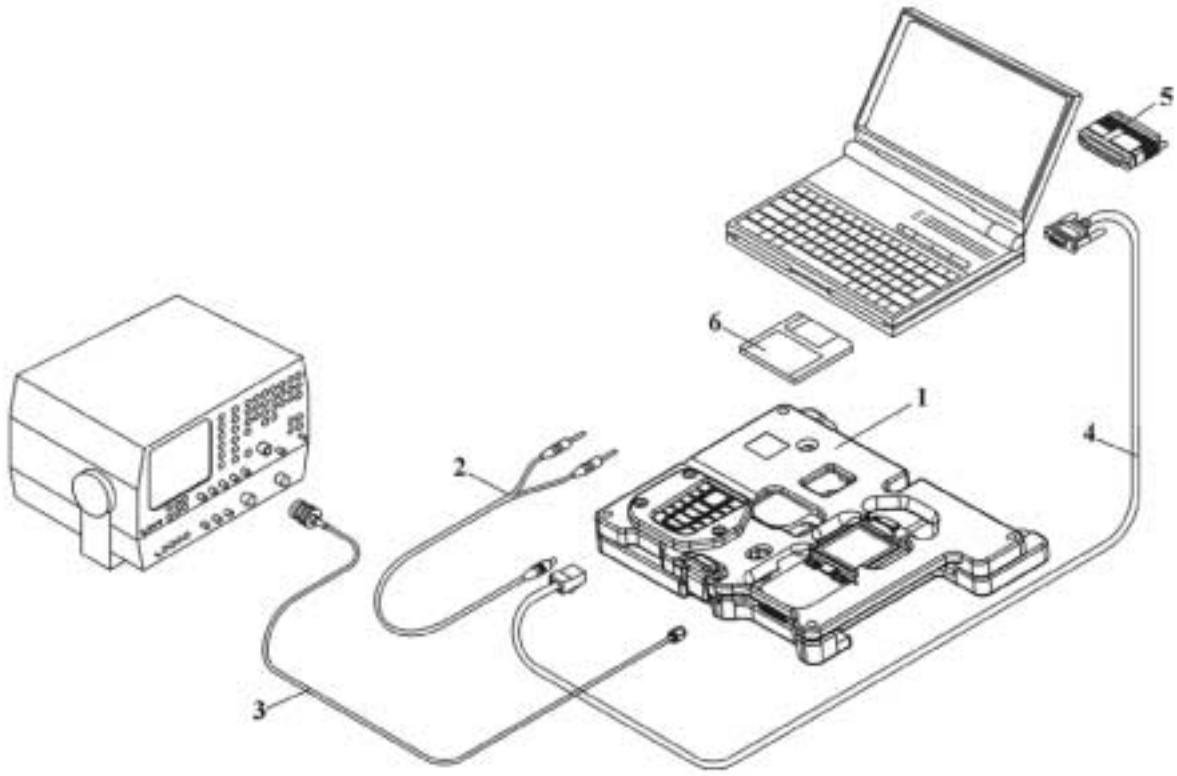
Service concept for RM-72* RF tunings



Item	Service accessory	Accessory type	Product code
1	Module jig	MJ-12	0770544
2	DC power cable	PCS-1	0730012
3	Modular cable	XRF-1	0730085
4	Service Mbus cable	DAU-9S	0730108

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Receiver Tunings

RX channel select filter calibration

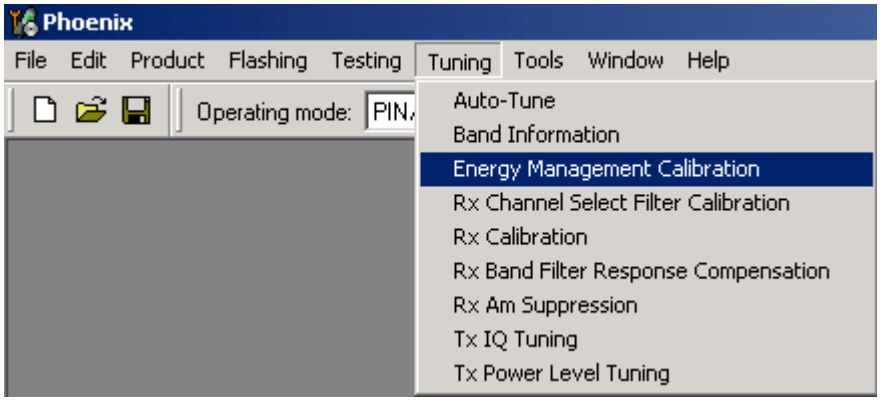
Extra equipment / external RF signal is not needed.

Must be done before other RX calibrations.

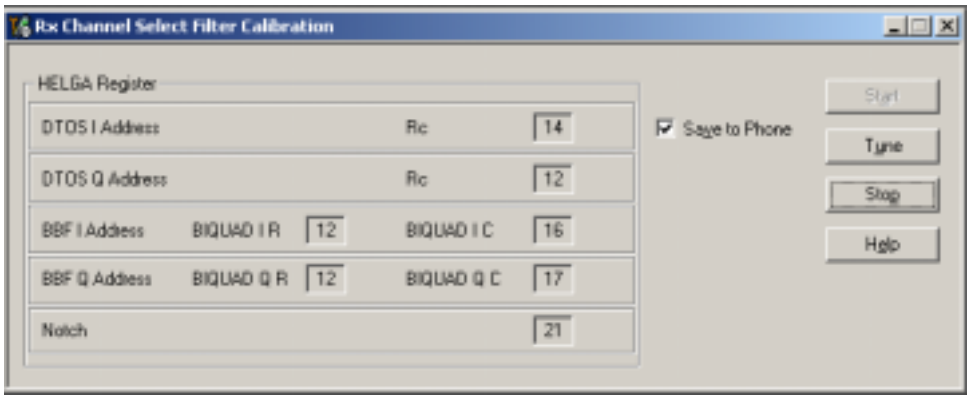
This function is used to calibrate RX channel select filter in GSM Phones.

Rx Channel select filter is tuned only in one (lowest) band = Single calibration for all bands.

Select **Tuning => Rx Channel select filter calibration.**



Press “**Tune**" to start the tuning.



Values will be saved to the phone when the “**Save to Phone**” tick box is checked.

If the “**Save to Phone**” tick box is *not* checked, the values are not saved to the phone when you stop the tuning or exit the dialog.

Tuning values should be 0…31.

Select “**Stop**”.

Close the “**RX Channel Select Filter Calibration**“ dialog to end tuning.

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RX calibration

RF generator is needed.

This tuning performs RX Calibration.

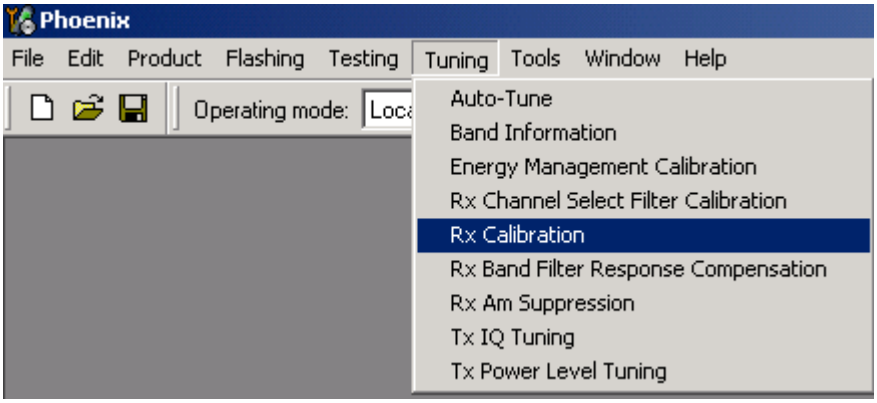
Must be done separately on all bands!

Calibration is automatically performed at EGSM (GSM900), then at GSM1800 and finally at the GSM1900 band. If the tuning is successful, it continues in the next band.

AFC tuning is carried out while EGSM (GSM900) band RX Calibration is performed.

Remember to take jig and cable attenuations into account!

Select **Tuning => Rx calibration**



EGSM900 band

Press "**Start**" to begin.

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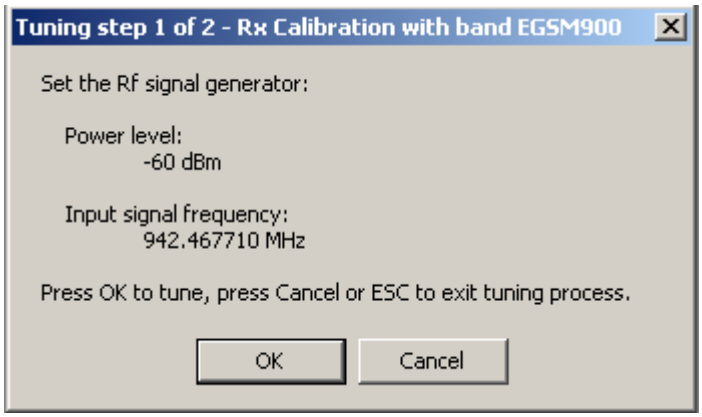
Set RF generator to required EGSM900 frequency => OK


Tuning step 1 of 2 - Rx Calibration with band EGSM900
Set the Rf signal generator:
Power level:
-60 dBm
Input signal frequency:
942.467710 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Tuning values and ADC readings will be shown

Typical values and limits in (GSM900) RX Calibration:

GSM900	Typical value	Low limit	High limit
AFC value	0	-350	350
AFC slope	150	50	350
RSSI 0	68	58	78
RSSI 1	74	64	84
RSSI 2	80	70	90
RSSI 3	86	76	96
RSSI 4	92	82	102
RSSI 5	97	87	107
RSSI 6	103	93	113
RSSI 7	109	99	119
RSSI 8	115	105	125
RSSI 9	121	111	131
RSSI 10	127	117	137
RSSI 11	133	123	143
RSSI 12	139	129	149
RSSI 13	145	135	155
RSSI 14	151	141	161

Tuning will automatically move to the next band (GSM1800) when you press "**Save & Continue**".

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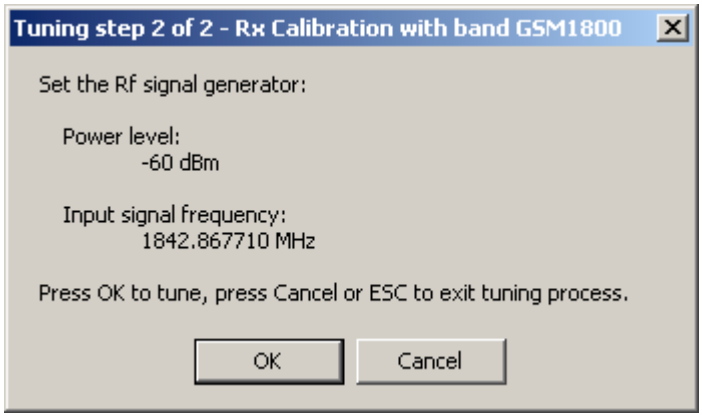
GSM1800 band

When asked, set the RF generator to required GSM1800 frequency => **OK**


Tuning step 2 of 2 - Rx Calibration with band GSM1800
Set the Rf signal generator:
Power level:
-60 dBm
Input signal frequency:
1842.867710 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Tuning values and ADC readings will be shown.

Typical values and limits in (GSM1800) RX Calibration:

GSM1800	Typical value	Low limit	High limit
RSSI 0	65	55	75
RSSI 1	71	61	81
RSSI 2	77	67	87
RSSI 3	83	73	93
RSSI 4	89	79	99
RSSI 5	94	84	104
RSSI 6	100	90	110
RSSI 7	106	96	116
RSSI 8	112	102	122
RSSI 9	118	108	128
RSSI 10	124	114	134
RSSI 11	130	120	140
RSSI 12	136	126	146
RSSI 13	142	132	152
RSSI 14	148	138	158

Tuning will automatically move to the next band (GSM1900) when you press "**Save & Continue**"

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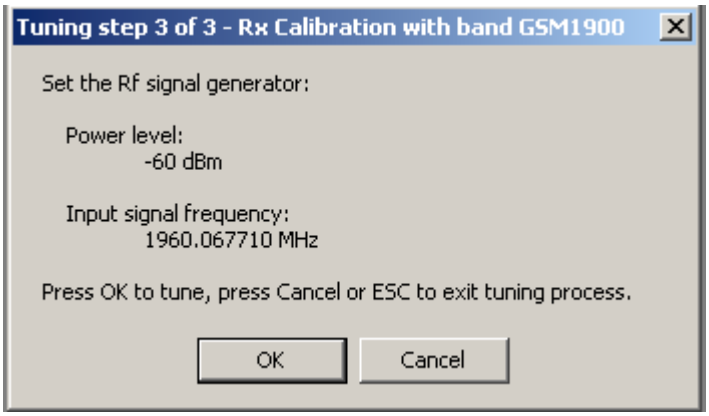
GSM1900 band

Set RF generator to required GSM1900 frequency => OK


Tuning step 3 of 3 - Rx Calibration with band GSM1900
Set the Rf signal generator:
Power level:
-60 dBm
Input signal frequency:
1960.067710 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Tuning values and ADC readings will be shown

Typical values and limits in (GSM1900) RX Calibration:

GSM1900	Typical value	Low limit	High limit
RSSI 0	67	57	77
RSSI 1	73	63	83
RSSI 2	79	69	89
RSSI 3	85	75	95
RSSI 4	91	81	101
RSSI 5	98	88	108
RSSI 6	104	94	114
RSSI 7	110	100	120
RSSI 8	116	106	126
RSSI 9	122	112	132
RSSI 10	128	118	138
RSSI 11	134	124	144
RSSI 12	140	130	150
RSSI 13	146	136	156
RSSI 14	152	142	162

Tuning will be completed when you press **“Save & Continue”**.

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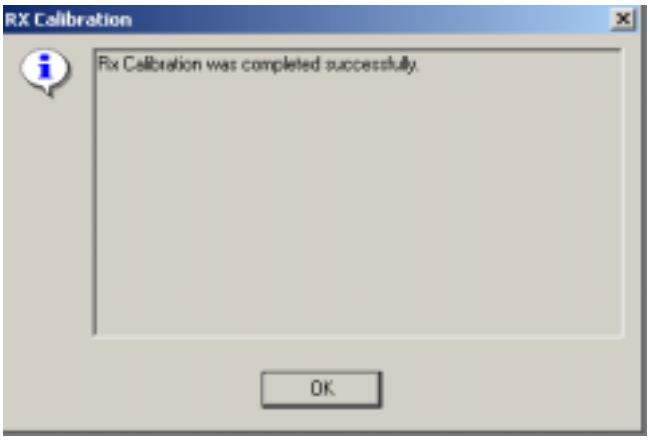
Close the “**RX – Calibration**” dialog to end tuning.



RX band filter response compensation

RF generator needed.

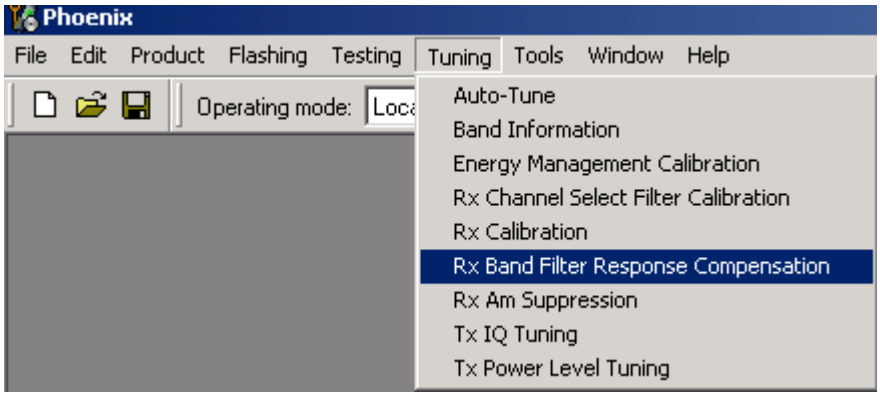
Must be performed separately on all bands!

Start the RX calibration at EGSM (GSM900), then continue to the GSM1800 band and finally to the GSM1900 band.

Remember to carry out the RX calibration before carrying out Rx band filter response compensation!

Remember to take jig and cable attenuations into account!

Select **Tuning => Rx Band Filter Response Compensation**



Select "**Manual tuning**" and “**Start**”.

You will be asked to supply 9 different RF frequencies to the phone on each band.

The tuning begins from EGSM900 band and continues the same way for GSM1800 and GSM1900 bands.

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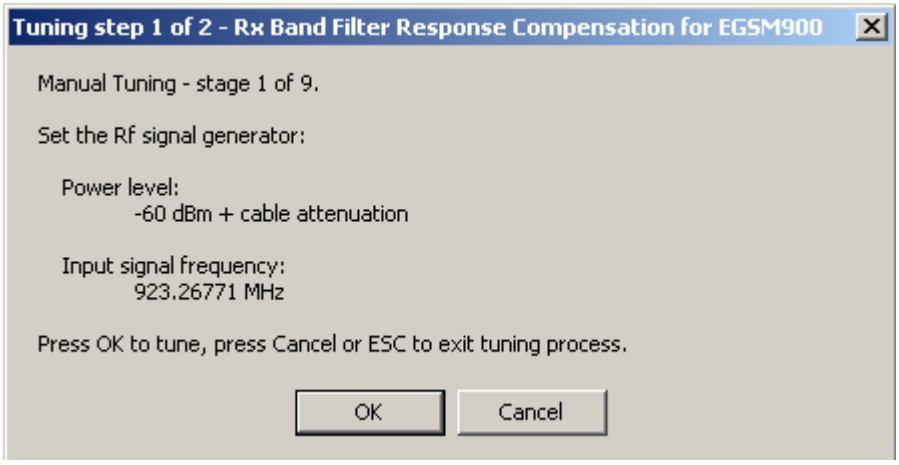
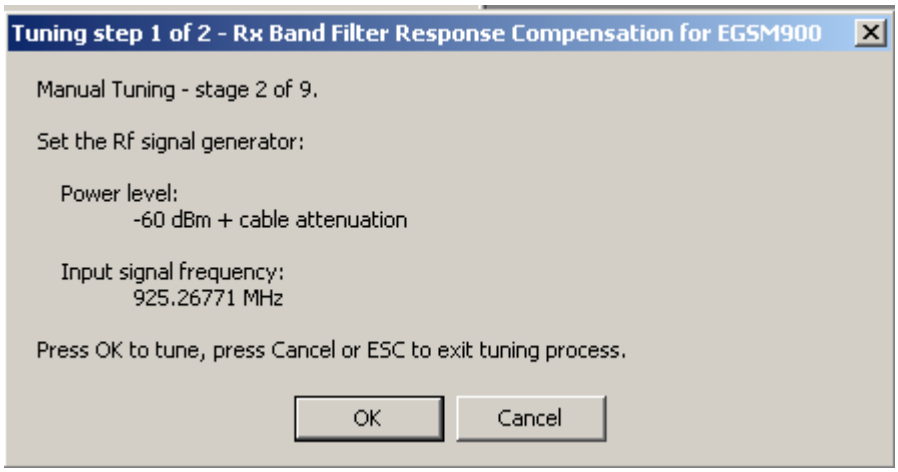
EGSM900 band

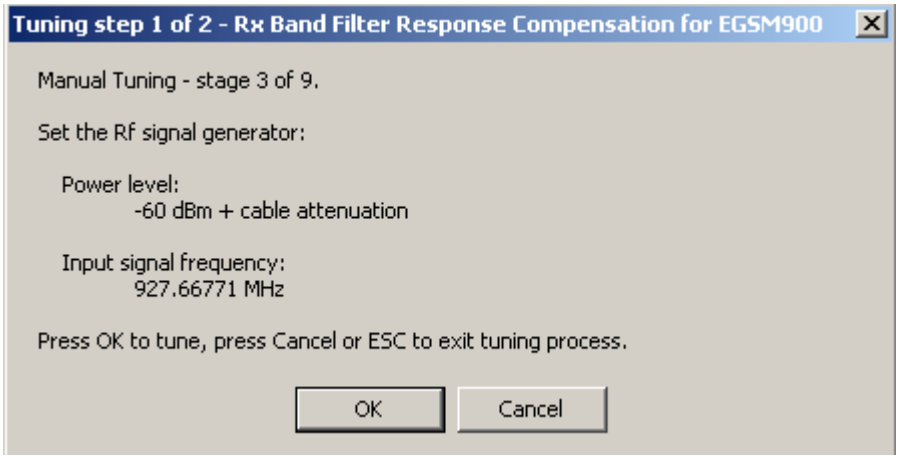
Set first required frequency and level => OK


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 1 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
923.26771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Set 2nd required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 2 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
925.26771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Set 3rd required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 3 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
927.66771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

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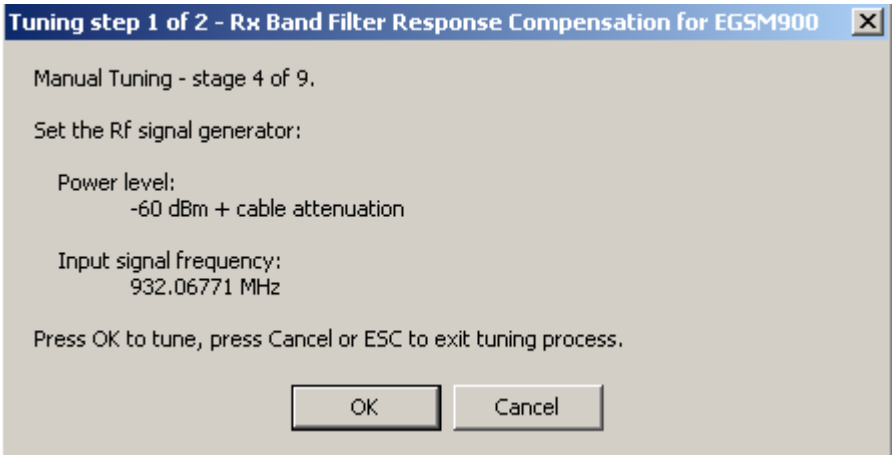
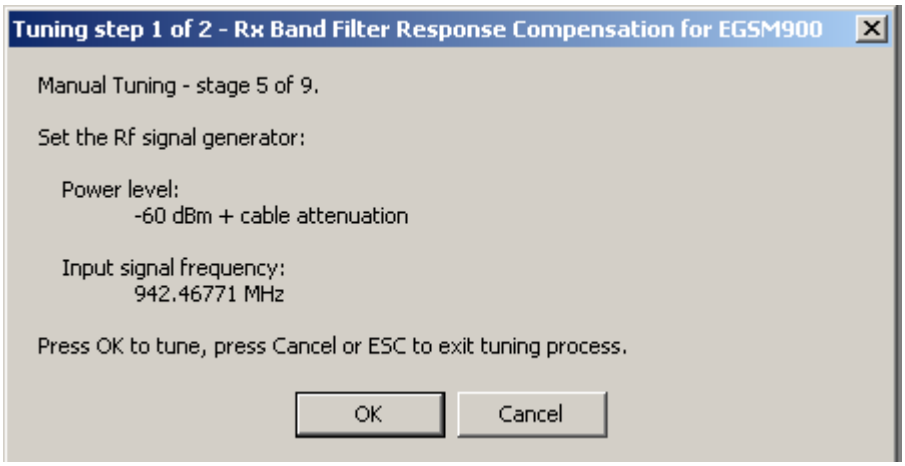
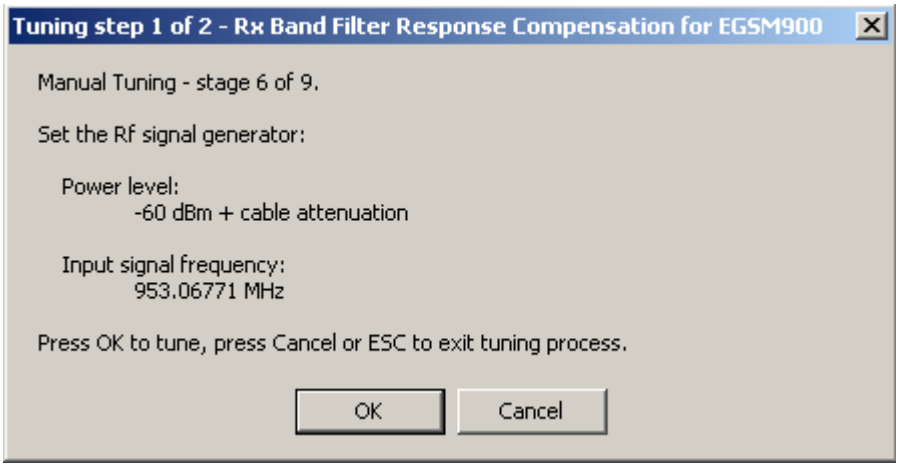
Set 4th required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 4 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
932.06771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Set 5th required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 5 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
942.46771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Set 6th required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 6 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
953.06771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

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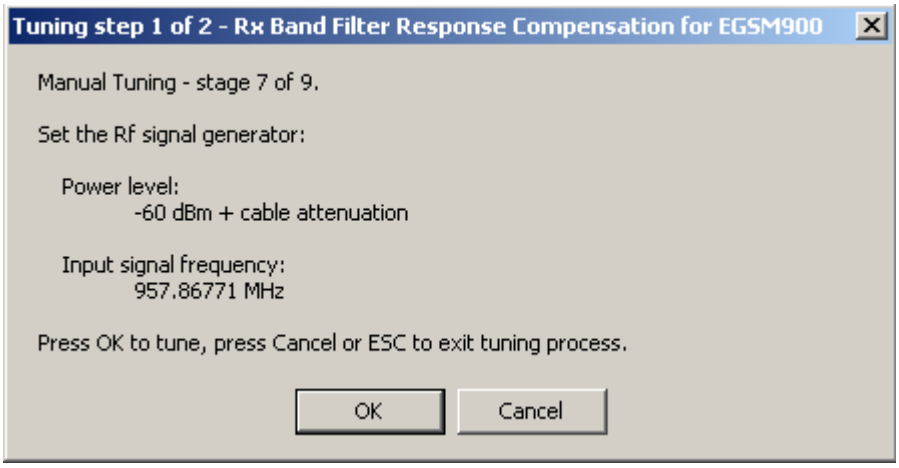
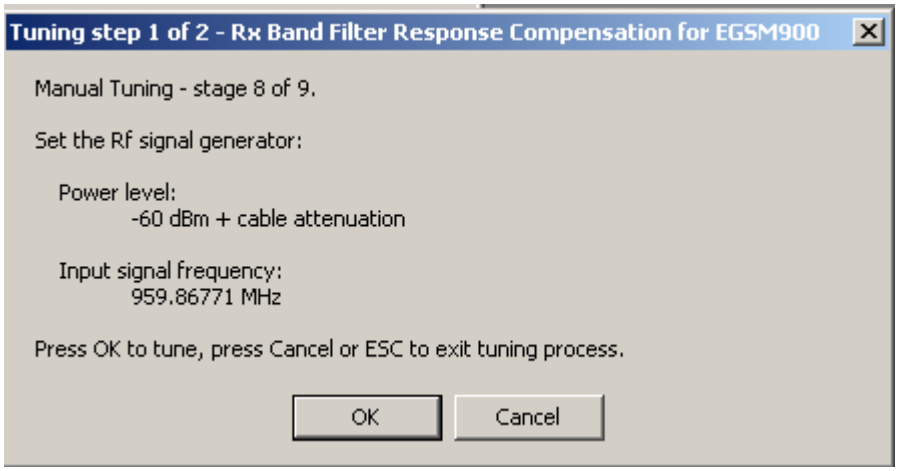
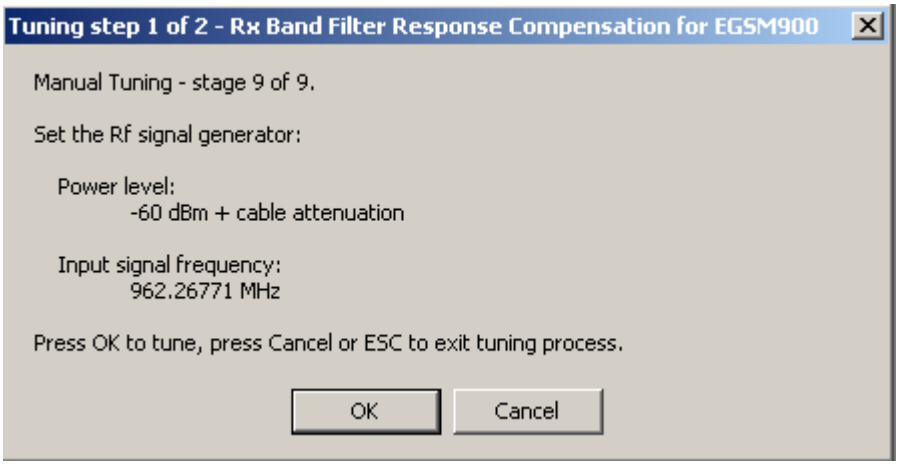
Set 7th required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 7 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
957.86771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Set 8th required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 8 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
959.86771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Set 9th required frequency and level => **OK**


Tuning step 1 of 2 - Rx Band Filter Response Compensation for EGSM900
Manual Tuning - stage 9 of 9.
Set the Rf signal generator:
Power level:
-60 dBm + cable attenuation
Input signal frequency:
962.26771 MHz
Press OK to tune, press Cancel or ESC to exit tuning process.
OK
Cancel

Tuning values and ADC readings will be shown.

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Typical values and limits in Rx Band Filter Response Compensation EGSM900:

Channel	Input frequency [MHz]	Typical value [dB]	Low limit [dB]	High limit [dB]
965	923.26771	+-3	-10	5
975	925.26771	+-1	-5	5
987	927.66771	+-1	-5	5
1009	932.06771	+-1	-5	5
37	942.46771	+-1	-5	5
90	953.06771	+-1	-5	5
114	957.86771	+-1	-5	5
124	959.86771	+-1	-5	5
136	962.26771	+-3	-10	5

Tuning will automatically move to the next band (GSM1800) when you press **“Save & Continue”**.

GSM1800 band

Repeat the same steps as for the EGSM900 band above.

Typical values and limits in Rx Band Filter Response Compensation GSM1800:

Channel	Input frequency [MHz]	Typical value [dB]	Low limit [dB]	High limit [dB]
497	1802.26771	+-3	-10	5
512	1805.26771	+-1	-5	5
535	1809.86771	+-1	-5	5
606	1824.06771	+-1	-5	5
700	1842.86771	+-1	-5	5
791	1861.06771	+-1	-5	5
870	1876.86771	+-1	-5	5
885	1879.86771	+-1	-5	5
908	1884.46771	+-3	-10	5

Tuning will automatically move to the next band (GSM1900) when you press **“Save & Continue”**.

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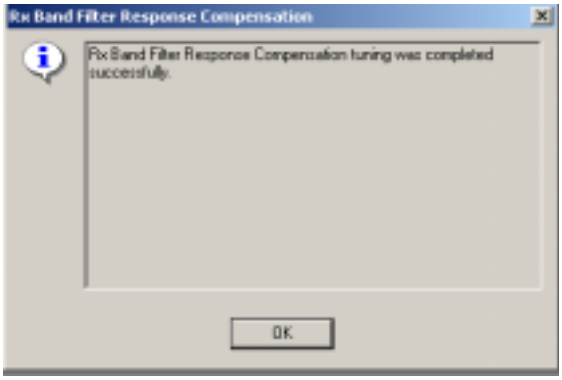
GSM1900 band

Repeat the same steps as for the EGSM900 and GSM1800 bands above.

Typical values and limits in Rx Band Filter Response Compensation GSM1900:

Channel	Input frequency [MHz]	Typical value [dB]	Low limit [dB]	High limit [dB]
496	1927.06771	+-3	-10	5
512	1930.26771	+-1	-5	5
537	1935.26771	+-1	-5	5
586	1945.06771	+-1	-5	5
661	1960.06771	+-1	-5	5
736	1975.06771	+-1	-5	5
794	1986.66771	+-1	-5	5
810	1989.86771	+-1	-5	5
835	1994.86771	+-3	-10	5

Tuning will be completed when you press **“Save & Continue”**.



Close the “RX Band Filter Response Compensation” dialog to end tuning.

RX AM suppression

RF generator needed (AM modulation).

Must be performed separately on all bands!

Start the RX calibration at EGSM (GSM900), then continue to the GSM1800 band and finally to the GSM1900 band.

This tuning performs RX AM suppression tuning.

Remember to take jig and cable attenuations into account!

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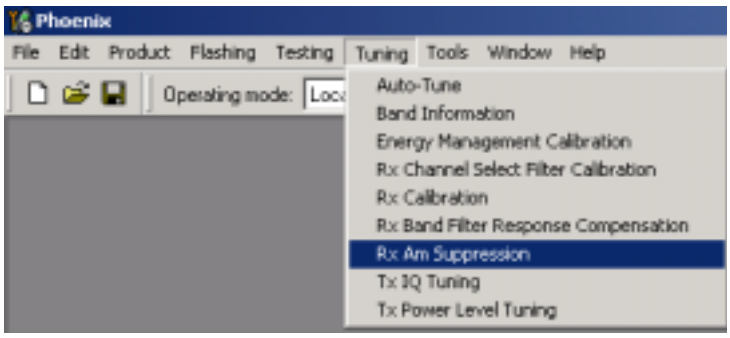
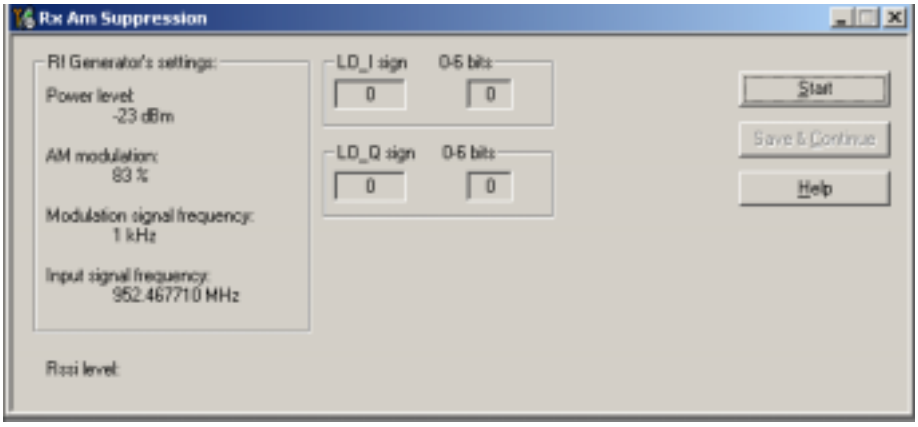
Select **Tuning => Rx Am suppression**



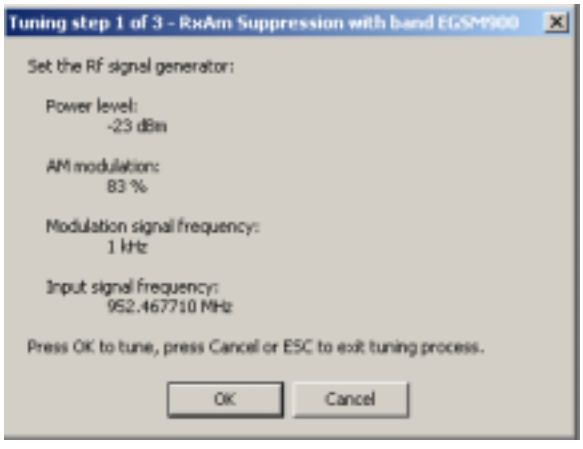
Set RF signal generator to correct settings described in the window on the left.

Select "**Start**" to begin tuning.



EGSM900 band

Set the required frequency and level => **OK**



Rx Am suppression values received from DSP will be shown in the center part of the UI.

Rssi level value will be shown in the left bottom part of the UI.

One "I" and "Q" line values should be 0, other values 0..31.

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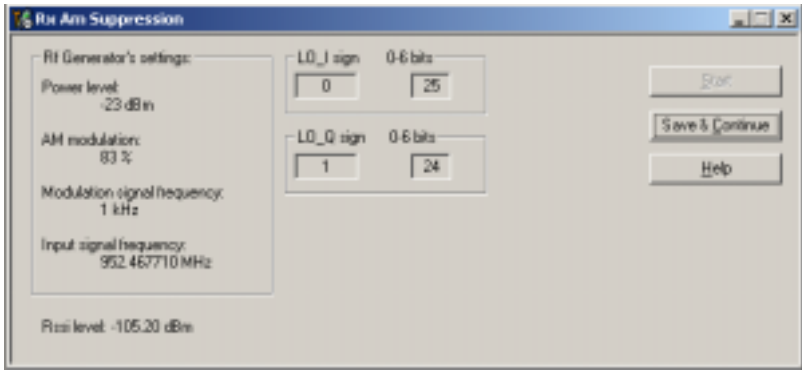
RSSI value results vary typically between -88 dBm…-111 dBm at EGSM900, GSM1800 and GSM1900 bands.



Tuning will automatically move to the next band (GSM1800) when you press **"Save & Continue"**.

GSM1800 Band

Repeat the same steps as for the EGSM900 band above.

Tuning values and ADC readings will be shown.

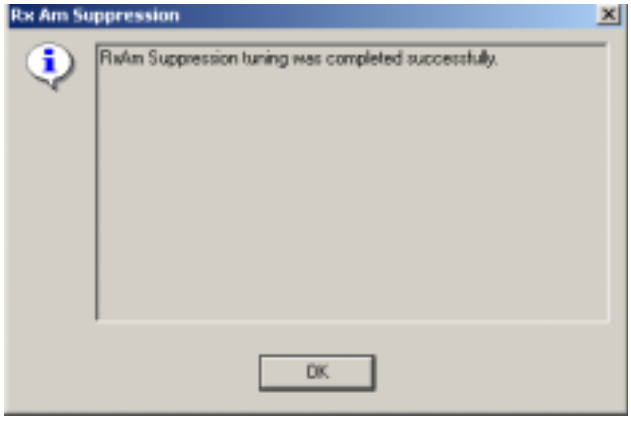
Tuning will automatically move to the next band (GSM1900) when you press **"Save & Continue".**

GSM1900 Band

Repeat the same steps as for the EGSM900 and GSM1800 bands.

Tuning values and ADC readings will be shown.

Tuning will be completed when you press "Save & Continue".



Close the RX AM Suppression Tuning dialog to end the tuning.

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Transmitter Tunings

TX power level tuning

Power Meter (or Spectrum analyzer) is needed.

With Tx power level tuning, the coefficients are adjusted for each power level.

Tuning must be performed separately on all band and all modes!

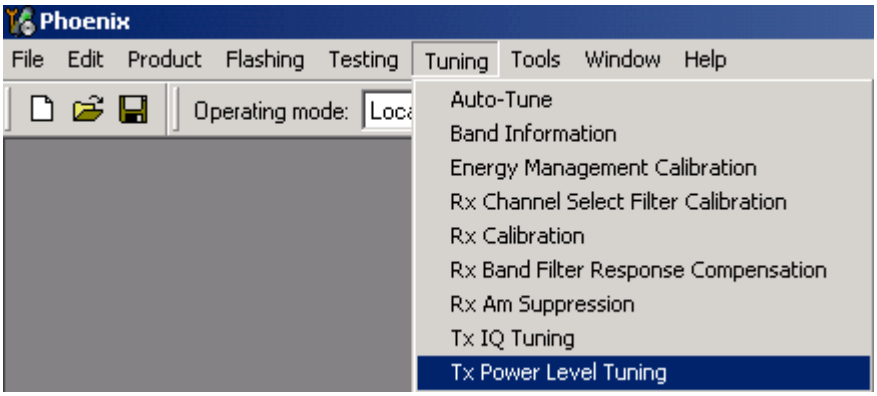
When EDGE is on, the tuning must be carried out for all power levels.

Tx power level tuning steps are:

- EGSM900 PA High Mode with EDGE off
- EGSM900 PA Low Mode with EDGE off *(NOT IN USE FOR RM-72)*
- EGSM900 PA High Mode with EDGE on
- EGSM900 PA Low Mode with EDGE *on (NOT IN USE FOR RM-72)*
- GSM1800 PA High Mode with EDGE off
- GSM1800 PA High Mode with EDGE on
- GSM1900 PA High Mode with EDGE off
- GSM1900 PA High Mode with EDGE on

Select **Tuning => Tx power level tuning**

Remember to take jig and cable attenuations into account!



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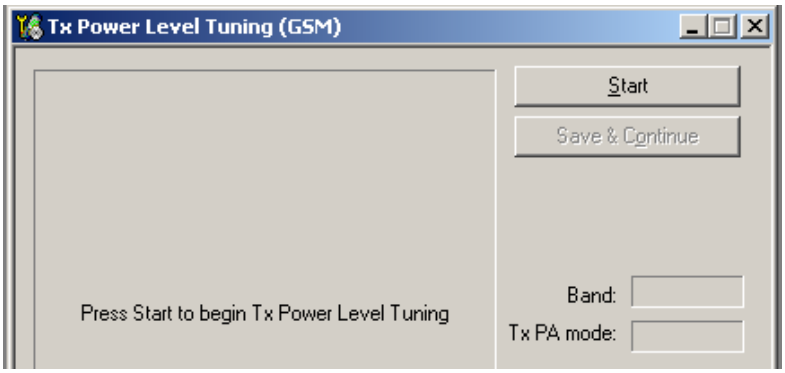
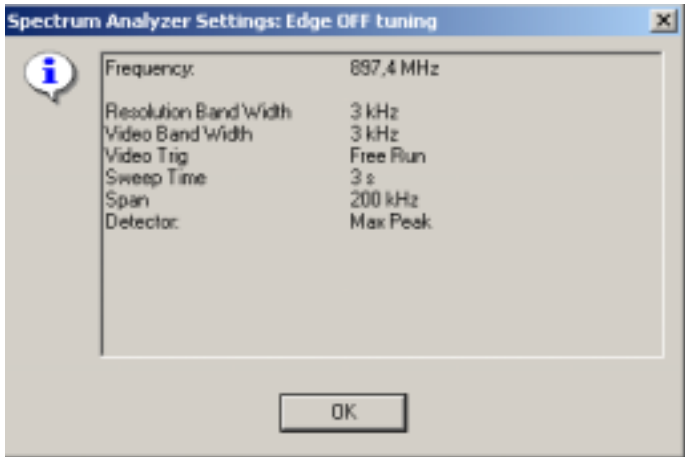
EGSM900 PA High Mode with EDGE off

Select “Start”, the tuning begins automatically from the EGSM900 band.



Set Power Meter (or Spectrum analyzer) as required.



Note that TX PA mode is “High” at this point.

The coefficient table lists the power level, coefficient, target dBm and DAC value for each power level.

The tuned power level can be chosen by using up and down arrows or mouse.

The current power level is shown with inverse colors.

The tuning value can be adjusted with “-“ and “+” keys.

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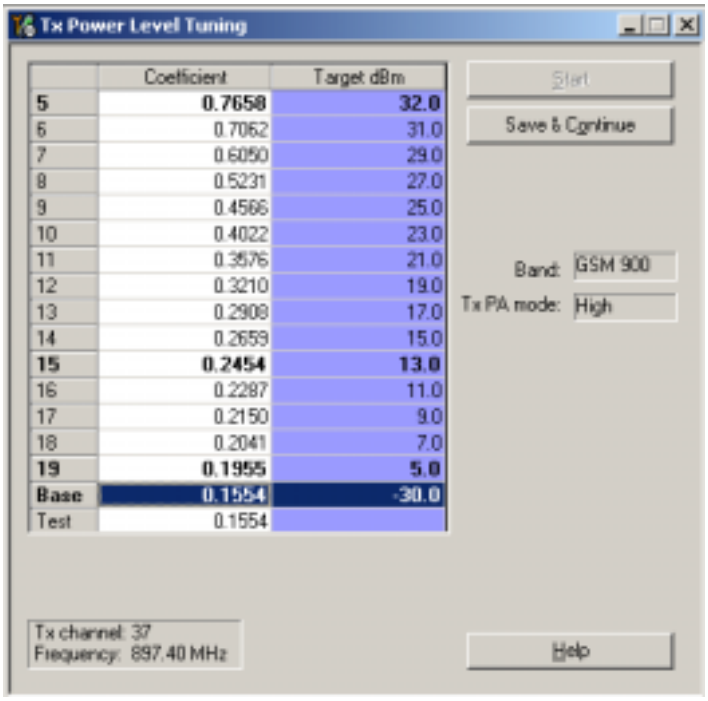
Tune base level and power levels 19,15 and 5 to target level.



When tuning values are correct, choose "**Save & Continue".**

If all coefficients are within specified limits, tuning will continue on the EGSM900 PA Low Mode with EDGE off.

Typical values:

Power level	GSM900 EDGE off
5	0.650 … 0.850
15	0.140 … 0.200
19	0.120 … 0.170
Base	0.090 … 0.130

EGSM900 PA low mode with EDGE off

This tuning step is not required for the RM-72 Product, the phone will not react to any controls.

Please choose **"Save & Continue"**

Tuning will continue on the EGSM900 PA High Mode with EDGE on.

EGSM900 PA high mode with EDGE on

Set Power Meter (or Spectrum analyzer) as required.

Repeat the same steps as for EGSM high and low mode above.

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When EDGE is on, the tuning must be made for all power levels.

Tune base level and all power levels from 19 to 8 to target level.

When tuning values are correct, choose "**Save & Continue"**.

If all coefficients are within specified limits, tuning will continue on the EGSM900 PA low mode with EDGE on.

Typical values:

Power level	GSM900 EDGE on
8	0.500 … 0.650
9	0.400 … 0.550
10	0.350 … 0.500
11	0.320 … 0.470
12	0.300 … 0.440
13	0.280 … 0.400
14	0.250 … 0.350
15	0.230 … 0.330
16	0.210 … 0.310
17	0.200 … 0.300
18	0.190 … 0.290
19	0.180 … 0.280
Base	0.100 … 0.180

EGSM900 PA low mode with EDGE on

This tuning step is not required for the RM-72 Product, phone will not react to any controls.

Please choose **"Save & Continue".**

Tuning will continue on the GSM1800 PA high mode with EDGE off.

GSM1800 PA high mode with EDGE off

Set Power Meter (or Spectrum analyzer) as required.

Repeat the same steps as for EGSM high and low mode above.

Tune base level and power levels 15,11 and 0 to target level.

When tuning values are correct, choose "**Save & Continue".**

If all coefficients are within specified limits, tuning will continue on the GSM1800 PA high mode with EDGE on.

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Typical values:

Power level	GSM1800 EDGE off
0	0.600 … 0.750
11	0.130 … 0.190
15	0.110 … 0.150
Base	0.090 … 0.130

GSM1800 PA high mode with EDGE on

Set Power Meter (or Spectrum analyzer) as required.

Repeat the same steps as for EGSM high and low mode above.

When EDGE is on, the tuning must be made for all power levels.

Tune base level and all power levels from 15 to 2 to target level.

When tuning values are correct, choose "**Save & Continue".**

If all coefficients are within specified limits, tuning will continue on the GSM1900 PA high mode with EDGE off.

Typical values:

Power level	GSM1800 EDGE on
2	0.550 … 0.700
3	0.470 … 0.620
4	0.400 … 0.550
5	0.350 … 0.500
6	0.320 … 0.470
7	0.290 … 0.430
8	0.260 … 0.360
9	0.240 … 0.330
10	0.220 … 0.310
11	0.210 … 0.300
12	0.200 … 0.280
13	0.180 … 0.260
14	0.170 … 0.250
15	0.160 … 0.240
Base	0.090 … 0.160

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GSM1900 PA high mode with EDGE off

Set Power Meter (or Spectrum analyzer) as required.

Repeat the same steps as for EGSM high and low mode above.

Tune base level and power levels 15,11 and 0 to target level.

When tuning values are correct, choose "**Save & Continue".**

If all coefficients are within specified limits, tuning will continue on the GSM1900 PA high mode with EDGE on.

Typical values:

Power level	GSM1900 EDGE off
0	0.600 … 0.750
11	0.130 … 0.190
15	0.110 … 0.150
Base	0.090 … 0.130

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GSM1900 PA high mode with EDGE on

Set Power Meter (or Spectrum analyzer) as required.

Repeat the same steps as for EGSM high and low mode above.

When EDGE is on, the tuning must be made for all power levels.

Tune base level and all power levels from 15 to 2 to target level.

When tuning values are correct, choose "**Save & Continue".**

Typical values:

Power level	GSM1900 EDGE on
2	0.550 … 0.700
3	0.470 … 0.620
4	0.400 … 0.550
5	0.350 … 0.500
6	0.320 … 0.470
7	0.290 … 0.430
8	0.260 … 0.360
9	0.240 … 0.330
10	0.220 … 0.310
11	0.210 … 0.300
12	0.200 … 0.280
13	0.180 … 0.260
14	0.170 … 0.250
15	0.160 … 0.240
Base	0.090 … 0.160

If values shown are within limits select "**Save & Continue**", values are saved to phone memory.

Close the "**TX Power Level Tuning**" dialog to end tuning.

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TX I/Q tuning

Spectrum analyzer is needed.

Tx IQ tuning allows changing the Tx I DC Offset, Tx Q DC Offset, Amplitude difference and Phase difference.

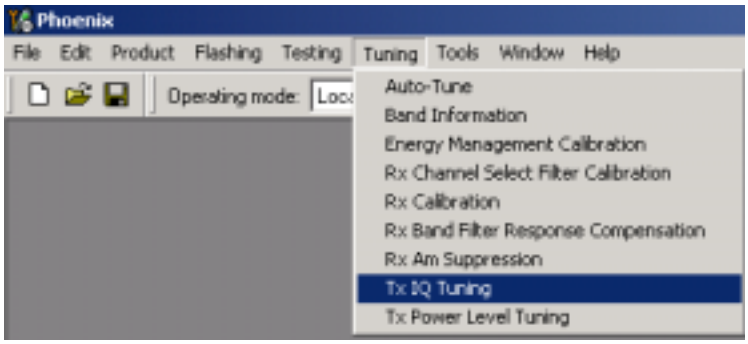
Must be performed separately on all bands!

TX I/Q tuning steps are:

- EGSM (GSM900) with EDGE off
- EGSM with EDGE on
- GSM1800 with EDGE off
- GSM1800 with EDGE on
- GSM1900 with EDGE off
- GSM1900 with EDGE on

Remember to take jig and cable attenuations into account!

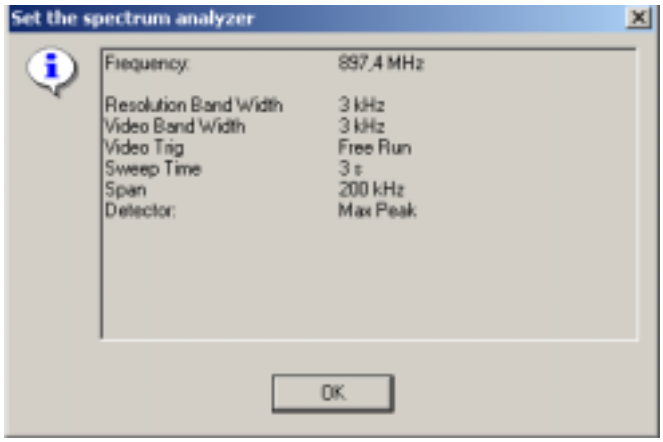
Select **Tuning => TX IQ Tuning**



EGSM900 band with EDGE Off

Select "**Start**" to begin tuning at **EGSM900 band with EDGE off**.

Set spectrum analyzer to required settings => **OK**



The tuning is carried out by setting each of the sliders to desired value. The sliders can be changed only when the tuning is ongoing.

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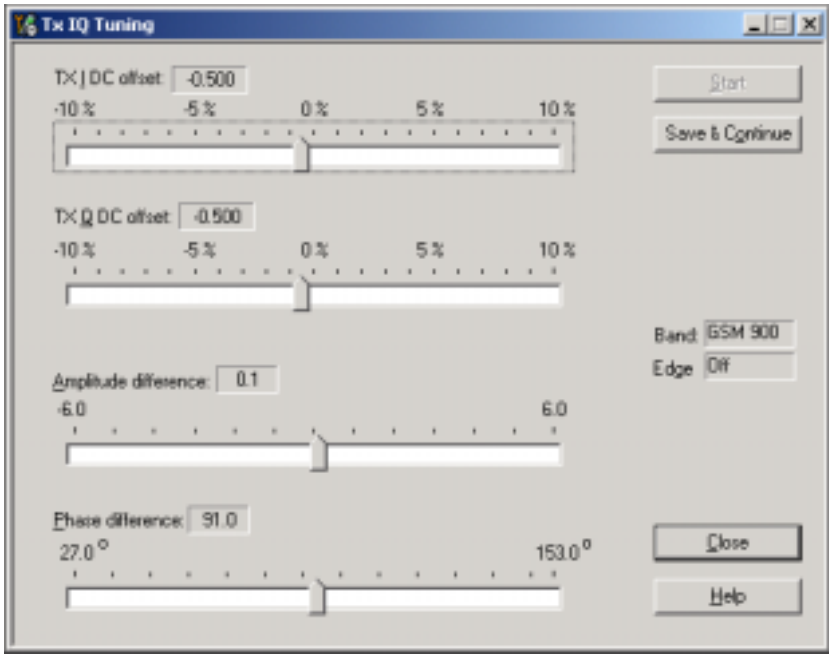
The order of tuning should be the same as the order of the sliders e.g. the Tx I DC Offset is tuned first and Phase difference is tuned last.

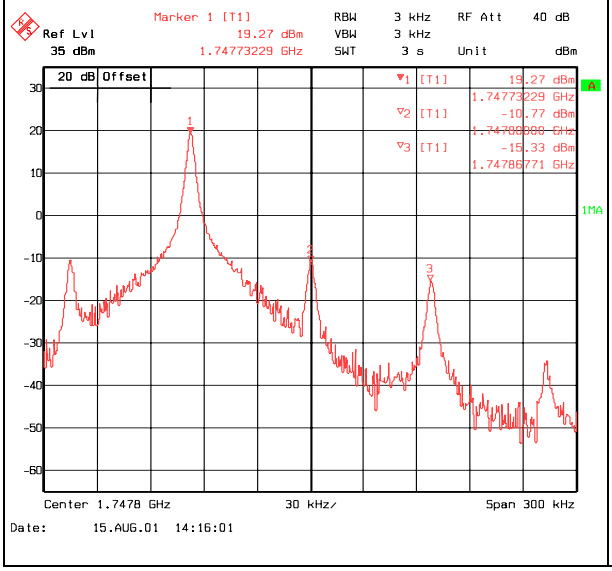
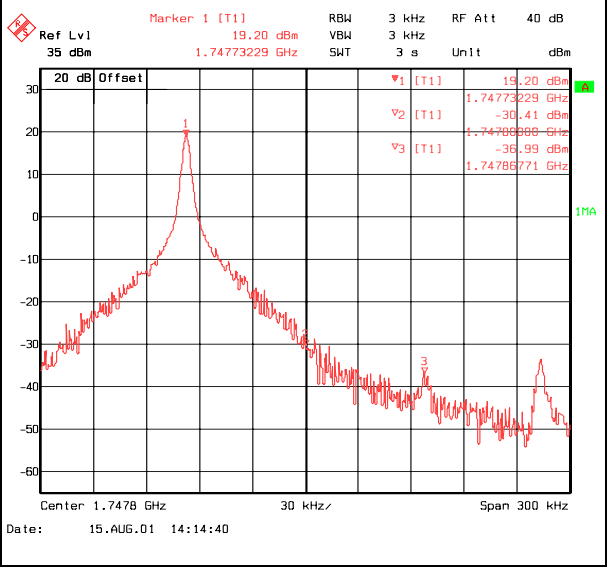
Use <= , =>, PgUp or PgDn keys

The tuning is performed by setting each of the sliders to desired value.



Tune LO leak to minimum with TXI/TXQ DC offset control (**f0 on spectrum analyzer screen**).

Tune the wrong sideband to minimum using Amplitude/Phase difference controls (**f0+68kHz on spectrum analyzer screen**).

Before tuning	After tuning
	

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Tx IQ Tuning limits are the same for all bands (GSM900, GSM1800 and GSM1900):

Tuning Limits	EDGE off	EDGE on
TX I DC Offset	-4 … +4	-6 … +6
TX Q DC Offset	-4 … +4	-6 … +6
Amplitude Difference	-1.2 … +1.2	-1 … +1
Phase Difference	80 … 100	80 … 100

Tuning will automatically move to the next step, **EGSM900 with EDGE on** when you press "**Save & Continue**".

EGSM900 band with EDGE On

Choose "Start" to begin tuning.

Set the spectrum analyzer to required settings for EGSM900 band => **OK**

Repeat the same tuning steps as for the EGSM900 with EDGE off above.

Tuning will automatically move to the next step, **EGSM1800 with EDGE off** when you press "**Save & Continue**".

EGSM1800 band with EDGE Off

Choose "Start" to begin tuning.

Set the spectrum analyzer to required settings settings for GSM1800 band => **OK**

Repeat the same tuning steps as for the EGSM900 band above.

Tuning will automatically move to the next step, **EGSM1800 with EDGE on** when you press "**Save & Continue**".

GSM1800 band with EDGE On

Choose "Start" to begin tuning.

Set the spectrum analyzer to required settings for GSM1800 band => **OK.**

Repeat the same tuning steps as for the EGSM900 band above.

Tuning will automatically move to the next step, **EGSM1900 with EDGE off** when you press "**Save & Continue.**

GSM1900 band with EDGE Off

Choose "Start" to begin tuning.

Set the spectrum analyzer to required settings for GSM1900 band=> **OK.**

Repeat the same tuning steps as for the EGSM900 band above.

Tuning will automatically move to the next step, **EGSM1900 with EDGE on** when you press "**Save & Continue**".

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GSM1900 band with EDGE On

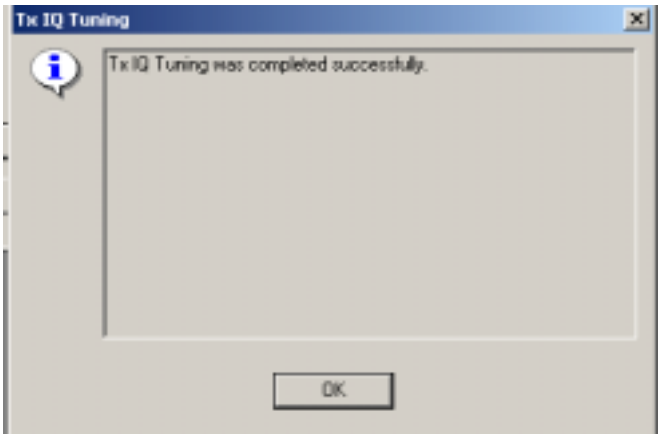
Choose “Start” to begin tuning.

Set the spectrum analyzer to required settings for GSM1900 band=> **OK.**

Repeat the same tuning steps as for the EGSM900 band above.

Tuning will be completed when you press **“Save & Continue”.**

Choose “**OK**” to close the “**TX I/Q Tuning**” dialog.



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4 - Service Tools

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List of Service Tools

The table below shows the set of tools that can be used for testing, error-analysis and repair of the RM-72 product.

Type Designator	Description	Part Code
DA-8	Docking station adaptor	0770546
	DA-8 Test pins	0770617
JBV-1	Docking station	0770298
SA-17	RF adaptor	0770584
PCS-1	DC power cable	0730012
SCB-3	DC cable	0730114
XCS-1	Service cable	0730218
XCS-4	Modular cable	0730178
MJ-12	Module repair jig	0770544
FLS-4S	POS flash adaptor dongle for EMEA POS flash adaptor dongle for APAC POS flash adaptor dongle for AMERICAS	0080541 0080542 0080542
FPS-8	Parallel flash prommer (Inc. AXS-4, AXS-8, ACF-8, printer cable)	0080321
	Printer cable (incl. In FPS-8 sales pack)	0730029
FPS-10	Flash prommer box	0086189
FPS-11	Parallel Flash prommer	0770758
XRF-1	RF cable	0730085
DAU-9S	MBUS cable	0730108
RJ-9	Soldering jig	0770547
MJS-76	Rework jig	0770417
SES-3	Rework stencil	0770558
SPS-1	Soldering Paste Spreader	0770381
SF-7	POS flash adaptor	0770545
	SF-7 Test pins	0770450

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JBV-1 Docking Station

The JBV-1 docking station is a general tool that has been designed for calibration and software update use. The DA-8 docking station adaptor is a product-specific tool that provides signal connections to the phone. The JBV-1 and the DA-8 are used as one unit.

The JVB-1 main electrical functions include the following:

- Adjustable VBATT calibration voltage, current measurement limit voltage: VCHAR, current measurement: ICHAR
- Adjustable ADC calibration voltage via BTEM and the BSI signal
- BTEMP and BSI calibration resistor
- Signal from FBUS to the phone via the parallel jig
- Control via FBUS or USB
- Flash OK/FAIL indication

In the calibration mode the JBV-1 is powered by an external power supply: 11-16V DC. When flashing, the power for the phone can be taken from the FPS-8 or an external power supply: 11-16 V DC.

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DA-8 Docking Station Adaptor

The docking station adaptor is used for the RM-72 in combination with the JBV-1. The DA-8 supports flashing and energy management calibration. If used in conjunction with the SA-17, a RF Go/NoGo test can be performed.

The MMC card is to be removed before mounting the phone on the docking station adaptor.

Features included:

- Compatible with the JBV-1
- Easy phone attachment and detachment
- Reliable phone locking (via DC-jack)
- Switch for detection of phone attachment
- Replaceable pogo pins

Product code

DA-8 Docking station adaptor: 0770546

View of DA-8 when mounted on the JBV-1

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SA-17 RF Adaptor

The SA-17 RF adaptor provides a galvanic connection to the RF output. The adaptor is intended for a Go/NoGo test. By removing the A&B covers and the antenna, the RF adaptor can be attached on the top section of the phone.

The adaptor is designed to be used with the DA-8 docking station adaptor or the SF-7 POS flash adaptor.

Product code

SA-17 RF adaptor: 0770584

View of SA-17

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MJ-12 Module Repair Jig

The MJ-12 Module repair jig is designed for Regional service centers to allow component level trouble shooting and testing.

Product code

MJ-12 Module Repair Jig: 0770544

General features

- EDS proof design
- Component level access while inserted in the jig
- Access to system connector
- SIM cards reader
- UI board with key mat integrated in the jig
- Access to phone module POWER-On push button
- Access to phone module side keys (volume keys)
- Support for IrDa testing
- BT coupler for Go/NoGo test

Power supply features

- Jig and phone supply via 5mm DC jack
- 2A replaceable fuse
- Voltage regulator
- Direct power feeding (bypassing regulator with a jumper)
- Reverse voltage protection
- Over-voltage protection
- On-indicator (green LED)

Spare parts

- Pogo pins used for RF connector (0770446)
- Pogo pins used for flash I/F (needs soldering) (0770551)
- Pogo pins used for SIM connection (needs soldering) (0770442)

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View of MJ-12

Note: The supply voltage for the MJ-12 has to be kept within the range of 8-12 V when using the built in regulator. When bypassing the regulator (IMEI rewrite), the voltage must be kept below 5,4V.

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RJ-9 Soldering Jig

The RJ-9 soldering jig is used for soldering and reworking for the ez4a Main board.

Product code

RJ-9 soldering jig: 0770547

View of RJ-9

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SES-3 Rework Stencil

The SES-3 Rework Stencil is used for PA Chip N700 (LGA type component) rework.

It is used together with the Rework Jig soldering paste spreader.

Product code

SES-3 Rework Stencil: 077031

The tools needed for rework include:

- MJS-76 Rework Jig: 0770417
- SES-3 Stencil: 0770558
- SPS-1 Soldering Paste Spreader: 0770381

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FPS-8 Flash Prommer (Sales Pack)

The Flash Prommer FPS-8 is used with e.g. DA-8 and JVB-1. Power is supplied to FPS-8 from the Universal Power Supply.

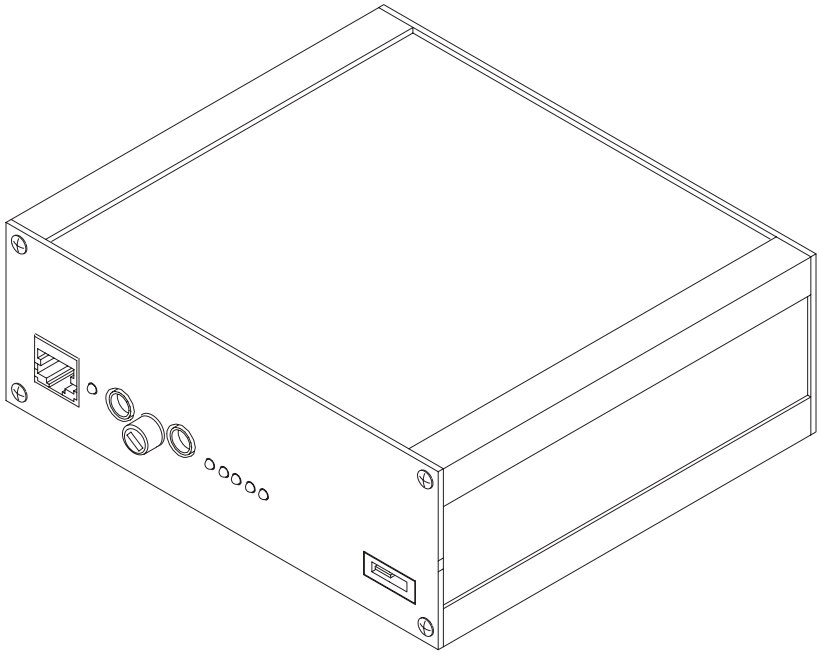
The sales pack includes:

- FPS-8 Flash Prommer: 0750123
- FPS-8 Activation Sheet: 9359289
- Universal Power Supply: 0680032
- AXS-4 Service Cable (D9-D9): 0730090
- Printer cable: 0730029

Sales package code

FPS-8 Flash Prommer: 0080321

View of FPS-8



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FPS-10 Flash Prommer

FPS-10 interfaces with:

- PC
- Control unit
- Flash adapter
- Smart card

FPS-10 flash prommer features:

- Provides flash functionality for BB5 terminals
- Smart Card reader for SX-2 or SX-4
- Forwards USB traffic through it
- Provides USB to FBUS/Flashbus conversion
- Provides LAN to FBUS/Flashbus and USB conversion
- Vusb output switchable by PC command

FPS-10 sales package includes:

- FPS-10 prommer (0770503)
- Power Supply with 5 country specific cords (0675525)
- USB cable (0730322)

Product code

FPS-10 Flash prommer: 0086189

View of FPS-10

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FPS-11 Parallel Flash Prommer

FPS-11 interfaces with:

- PC
- Control unit
- Flash adapter
- Smart card

FPS-11 flash prommer features:

- Can flash up to 8 phones at a time, controlled by one PC
- Communication method between PC and FPS-11 is single USB2.0
- No need for external power for powering up phones
- Smart Card reader for SX-2 and SX-4
- Updates software
- Future feature: will support all DCT-4 protocols and models

FPS-11 sales package includes:

- FPS-11
- Power Supply for FPS-11
- EUR, UK, USA Power cords
- USB2.0 cable

Product code

FPS-11 Parallel flash prommer: 0770758

View of FPS-11

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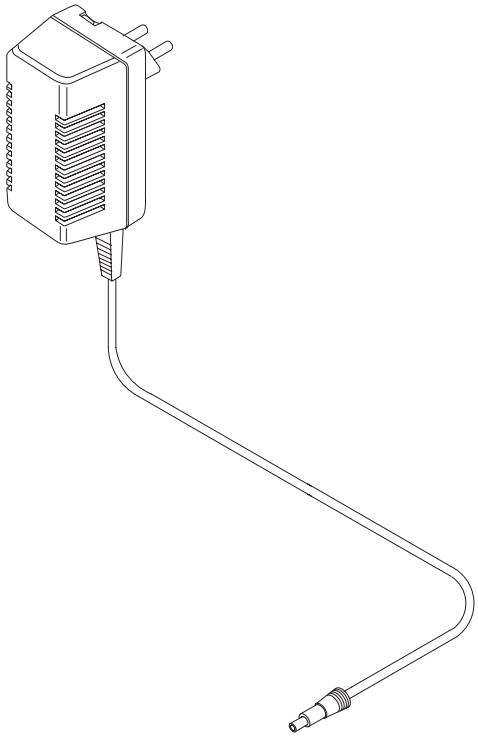
ACF-8 Universal Power Supply

The ACF-8 Universal Power Supply is used to power FPS-8. ACF-8 has 6 V DC and 2.1 A output.

Product code

ACF-8 Universal Power Supply: 0680032

View of ACF-8



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SF-7 POS Flash Adaptor

The SF-7 is a POS flash adaptor provided for the RM-72 phone.

Product code

SF-7 POS flash adaptor: 0770545

View of SF-7

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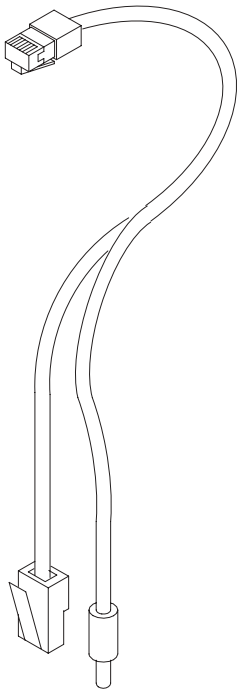
XCS-1 Service Cable

The XCS-1 Service Cable is used to connect FLS-4 to FLA-27.

Product code

XCS-1 Service Cable: 0730218

View of XCS-1



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FLS-4S POS (Point Of Sale) Flash Device (Sales Pack)

FLS-4S is a dongle and flash device incorporated into one package, developed specifically for POS use.

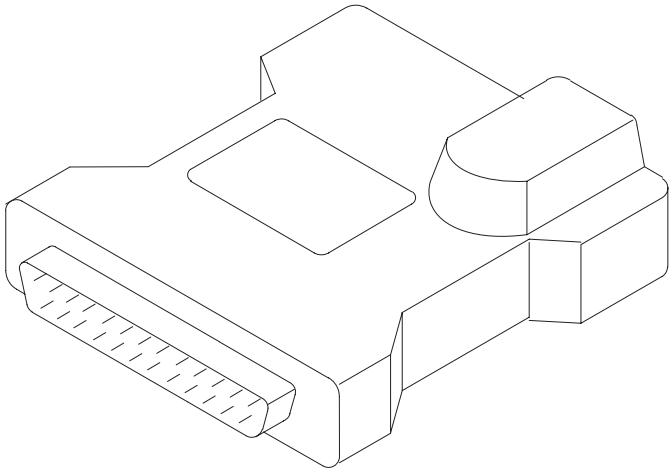
Product code

Sales Pack (Europe/Africa): 0080541

Sales Pack (APAC): 0080542

Sales Pack: (US): 080543

View of FLS-4S



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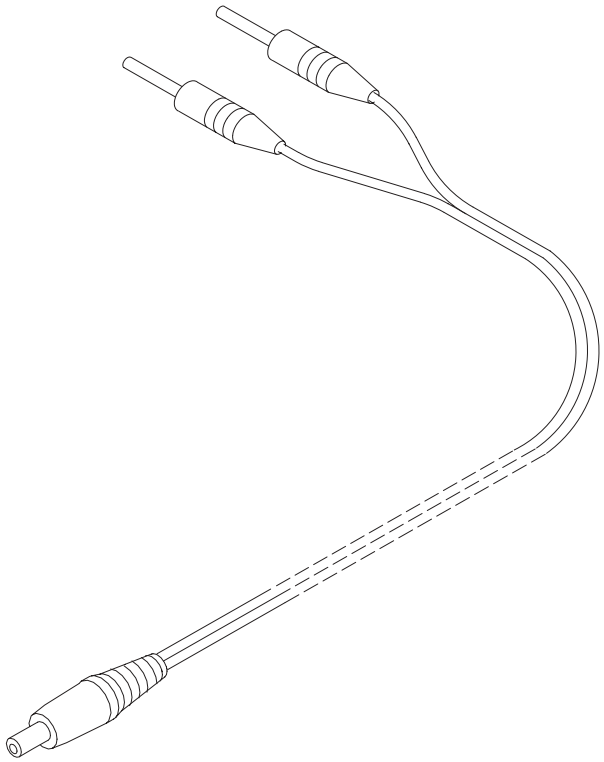
PCS-1 Power Cable

The PCS-1 Power Cable (DC) is used to connect e.g. JVB-1 to FPS-8.

Product code

PCS-1 Power Cable:0730012

View of PCS-1



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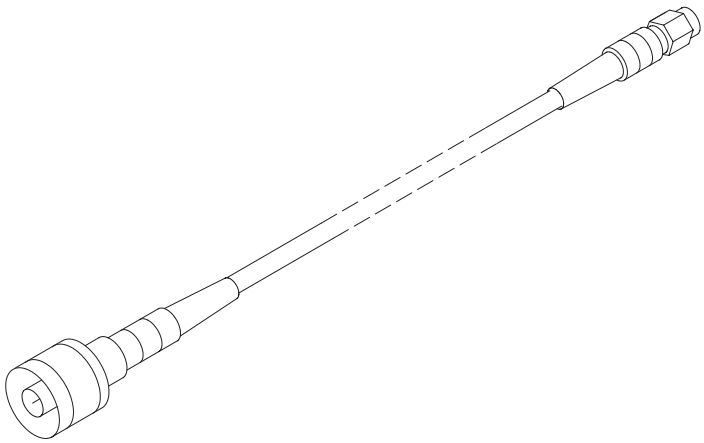
XRF-1 RF Cable

RF cable XRF-1 is used to connect e.g. Module Jig MJS-38 to RF measurement equipment.

Product code

XRF-1 RF Cable: 0730085

View of XRF-1



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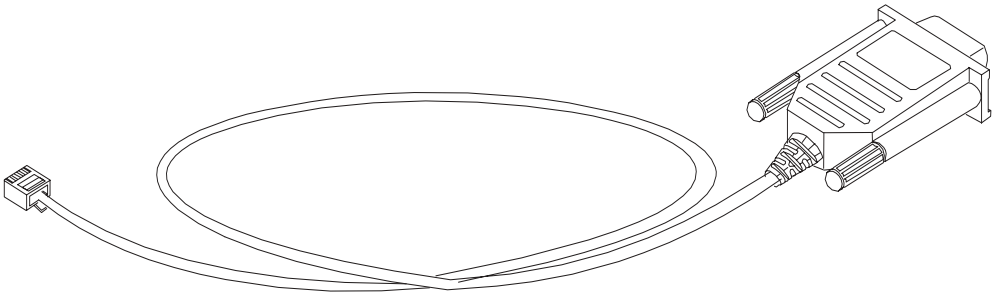
DAU-9S MBUS Cable

The MBUS Cable DAU-9S has a modular connector, and is used with between PC's serial port and e.g. Module Jig MJS-38.

Product code

DAU-9S MBUS Cable: 0730108

View of DAU-9S



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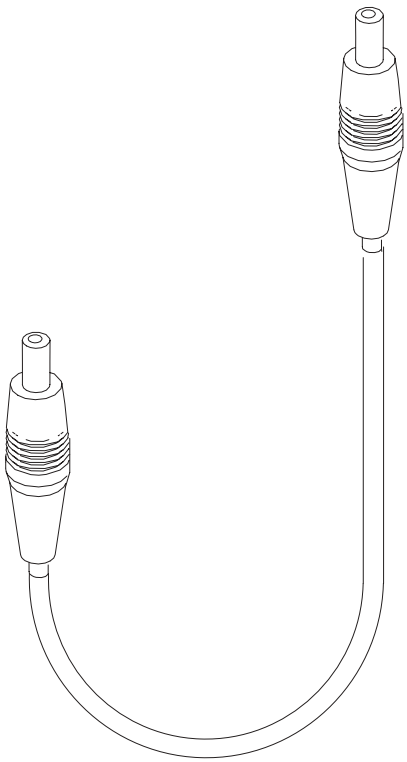
SCB-3 DC Cable

The DC Cable SCB-3 is used to connect e.g. JVB-1 to the phone.

Product code

SCB-3 DC Cable: 0730114

View of SCB-3



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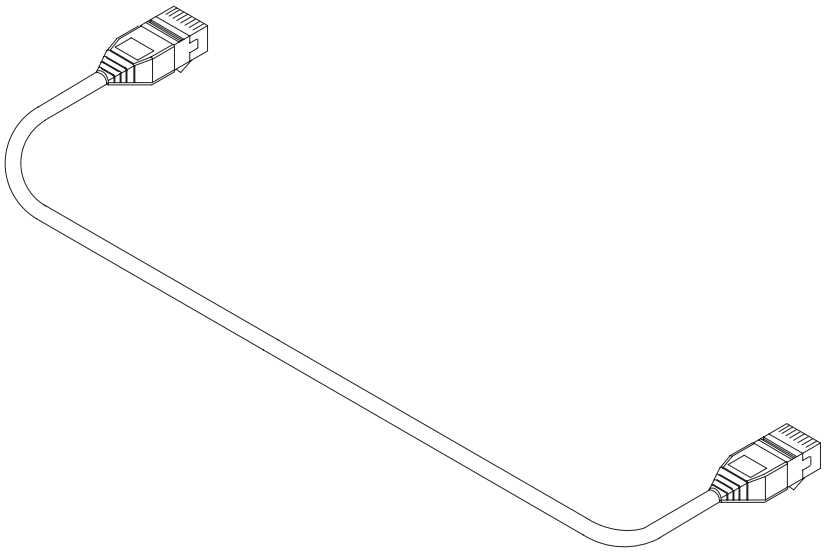
XCS-4 Modular Cable

XCS-4 is a shielded cable (one specially shielded conductor) modular cable for flashing and service purposes.

Product code

XCS-4 Modular Cable: 0730178

View of XCS-4



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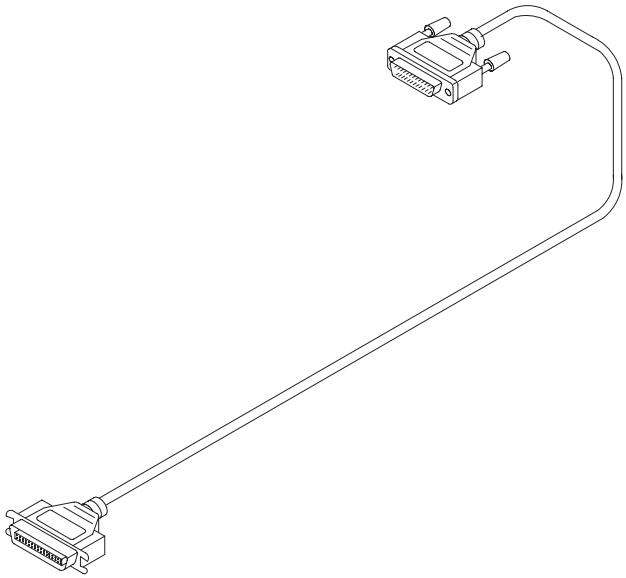
Printer Cable

This cable is used to connect the PC to FPS-8.

Product code

Printer Cable: 0730029

View of printer cable



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5 - Disassembly Instructions

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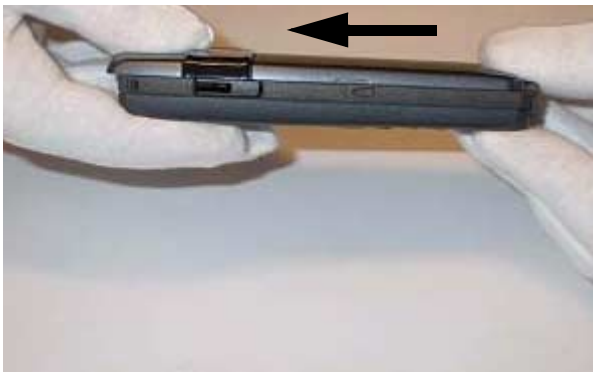
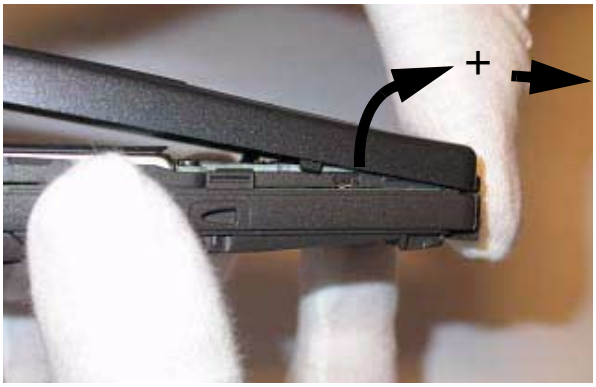
Disassembly Procedure

Note: Video clips are available at your service point.



Remove the B-cover assy.

Remove the A-cover assy.



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Remove the Antenna assy.
Use the SRT-6 OPENING TOOL (Part code: 0770431) when removing the Antenna assy.

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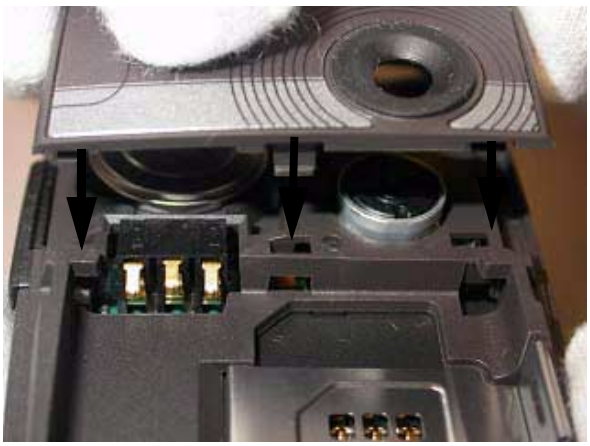
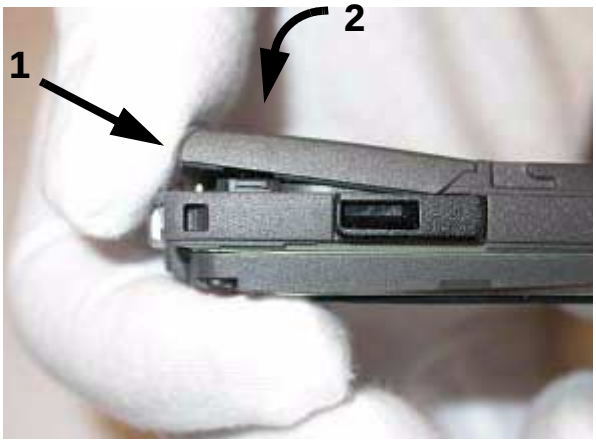
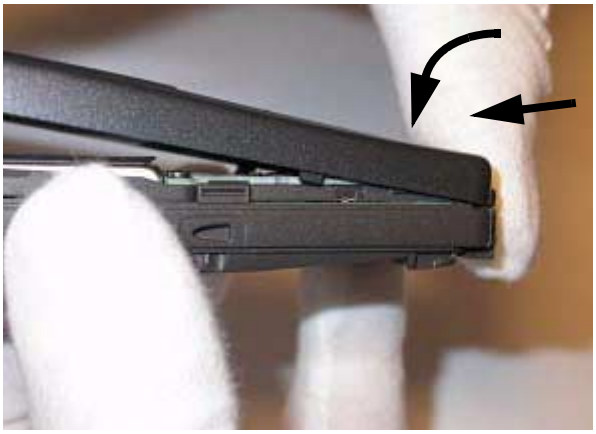
Reassembly Procedure



Mount the antenna assy.





Mount the A-cover assy.

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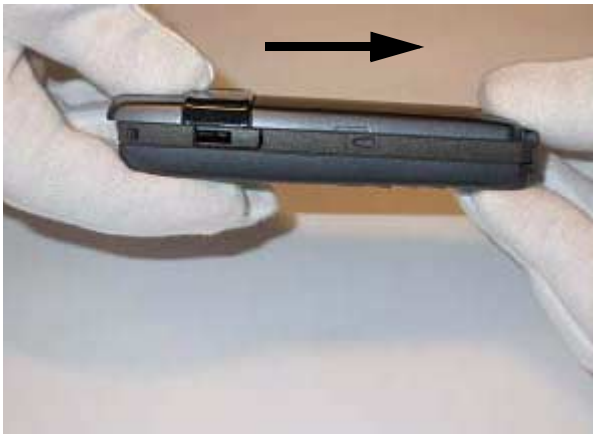

Mount the B-cover assy.

Mount the screws.
Use a flathead Torx 6IP 1.8 x 7.4 screw-driver to fasten the screws in the order shown in the diagram.
Torque 30Ncm at 650RPM.

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Nokia Customer Care

6(a) - Baseband Troubleshooting

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Introduction

This document describes in overview the different hardware error possibilities for the RM-72 phone.

Not every possible hardware error is described in this document, but only those possible to correct.

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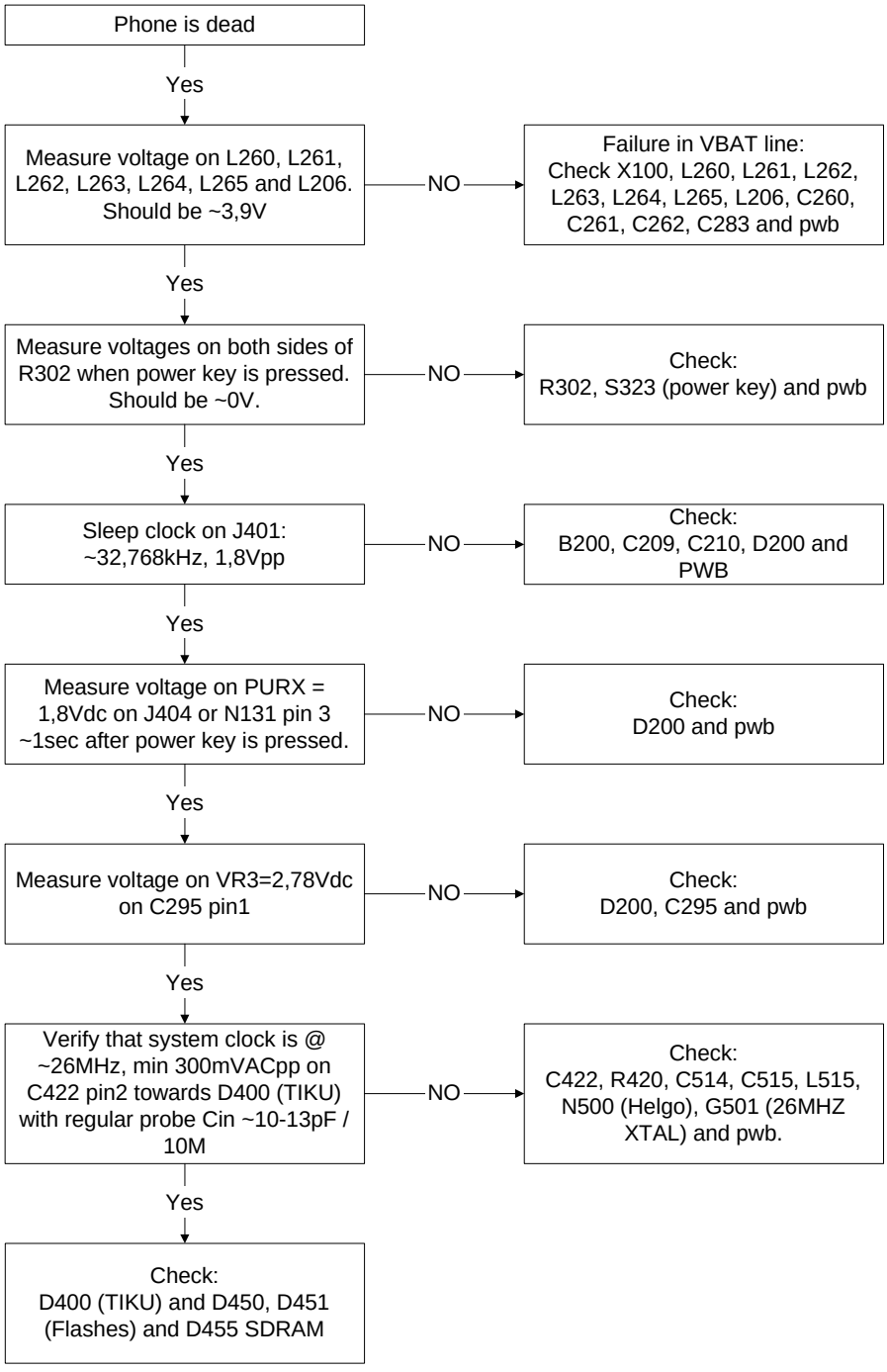
General Failures

Phone is dead

This means that the phone doesn't use any current at all when supply is connected and/or power key is pressed.

It is assumed that the voltage supplied is 3.9 Vdc. UEME prevents any functionality at battery/ supply levels below 2.9 Vdc and the software shuts the phone down at 3.1 Vdc.

Figure 1:Phone is dead


Phone is dead
Yes
Measure voltage on L260, L261, L262, L263, L264, L265 and L206. Should be ~3,9V
NO
Failure in VBAT line: Check X100, L260, L261, L262, L263, L264, L265, L206, C260, C261, C262, C283 and pwb
Yes
Measure voltages on both sides of R302 when power key is pressed. Should be ~0V.
NO
Check: R302, S323 (power key) and pwb
Yes
Sleep clock on J401: ~32,768kHz, 1,8Vpp
NO
Check: B200, C209, C210, D200 and PWB
Yes
Measure voltage on PURX = 1,8Vdc on J404 or N131 pin 3 ~1sec after power key is pressed.
NO
Check: D200 and pwb
Yes
Measure voltage on VR3=2,78Vdc on C295 pin1
NO
Check: D200, C295 and pwb
Yes
Verify that system clock is @ ~26MHz, min 300mVACpp on C422 pin2 towards D400 (TIKU) with regular probe Cin ~10-13pF / 10M
NO
Check: C422, R420, C514, C515, L515, N500 (Helgo), G501 (26MHZ XTAL) and pwb.
Yes
Check: D400 (TIKU) and D450, D451 (Flashes) and D455 SDRAM

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Flash programming does not work

In case of Flash failure, the problem is most likely related to SMD problems. Possible failures could be Short-circuiting of balls under µBGAs (e.g. UEMEK, TIKUEDGE, SDRAM, FLASH), missing or misaligned components.

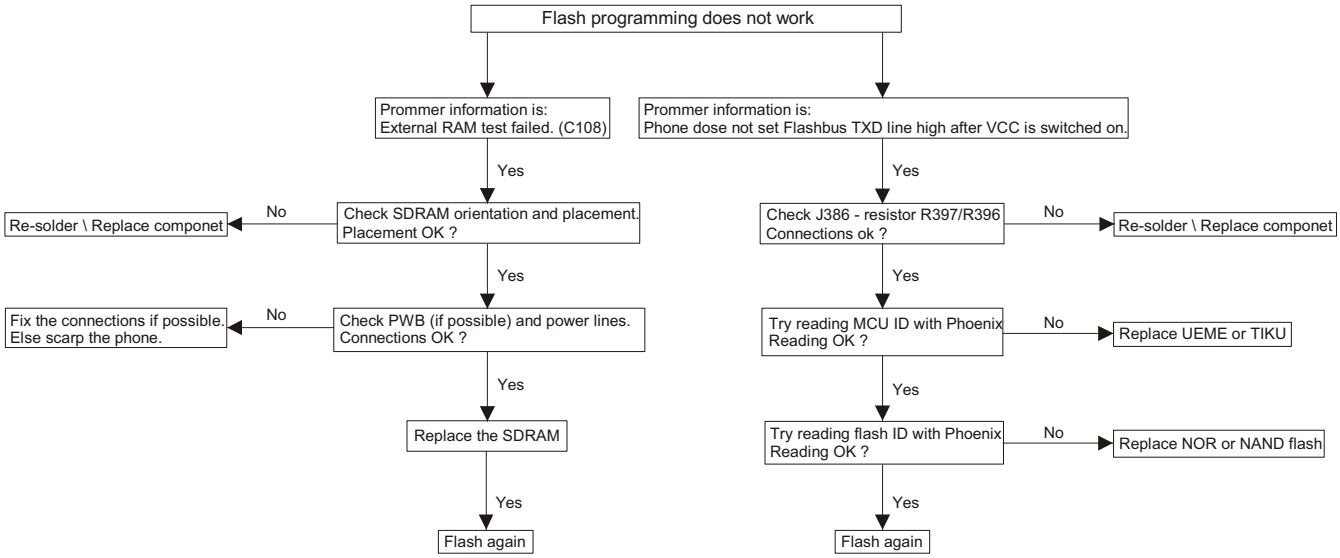
In flash programming error cases the flash prommer can give some information about the fault. The fault information messages could be:

- Phone does not set Flashbus TXD line high after VCC is switch on.
- External RAM test failed.

These errors are some of the most common errors and based on this, a troubleshooting diagram for flash programming is shown below. Various errors can appear from the prommer when flashing the phone - not all of them can be directly linked to the HW or phone.

Because of the use of uBGA components, it is not possible to verify on the diagram, if there is a short circuit in control and address/data lines on TIKUEDGE, NOR flash, NAND flash or SDRAM.

Figure 2:Flash programming does not work



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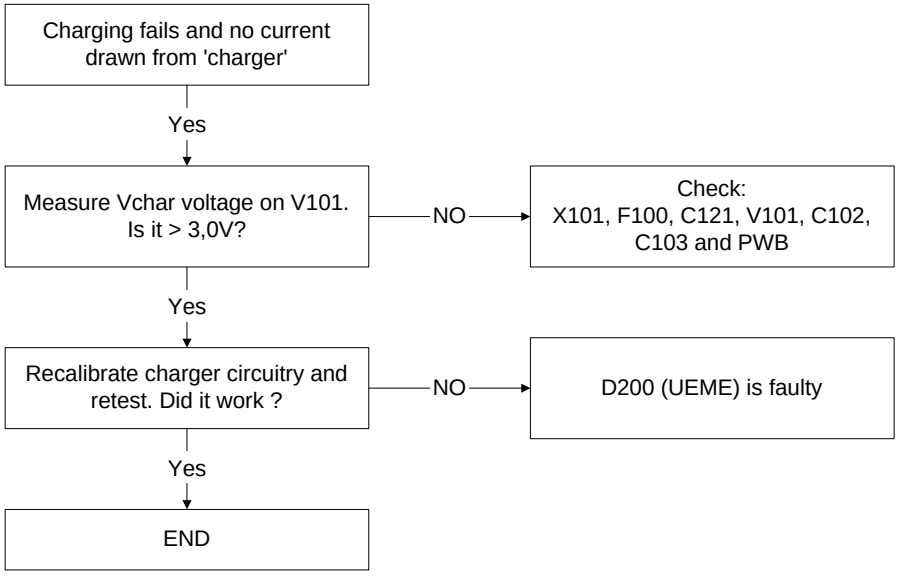
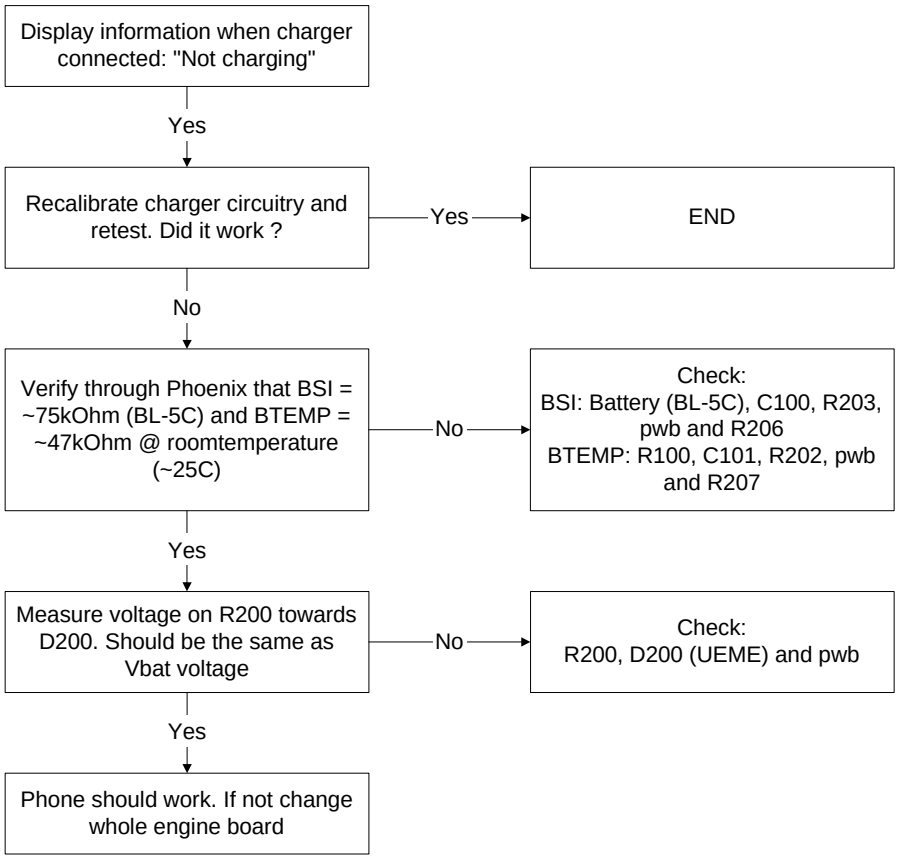
Charging Failure


Charging fails and no current drawn from 'charger'
Yes
Measure Vchar voltage on V101. Is it > 3,0V?
NO
Check: X101, F100, C121, V101, C102, C103 and PWB
Yes
Recalibrate charger circuitry and retest. Did it work ?
NO
D200 (UEME) is faulty
Yes
END


Display information when charger connected: "Not charging"
Yes
Recalibrate charger circuitry and retest. Did it work ?
Yes
END
No
Verify through Phoenix that BSI = ~75kOhm (BL-5C) and BTEMP = ~47kOhm @ roomtemperature (~25C)
No
Check: BSI: Battery (BL-5C), C100, R203, pwb and R206 BTEMP: R100, C101, R202, pwb and R207
Yes
Measure voltage on R200 towards D200. Should be the same as Vbat voltage
No
Check: R200, D200 (UEME) and pwb
Yes
Phone should work. If not change whole engine board

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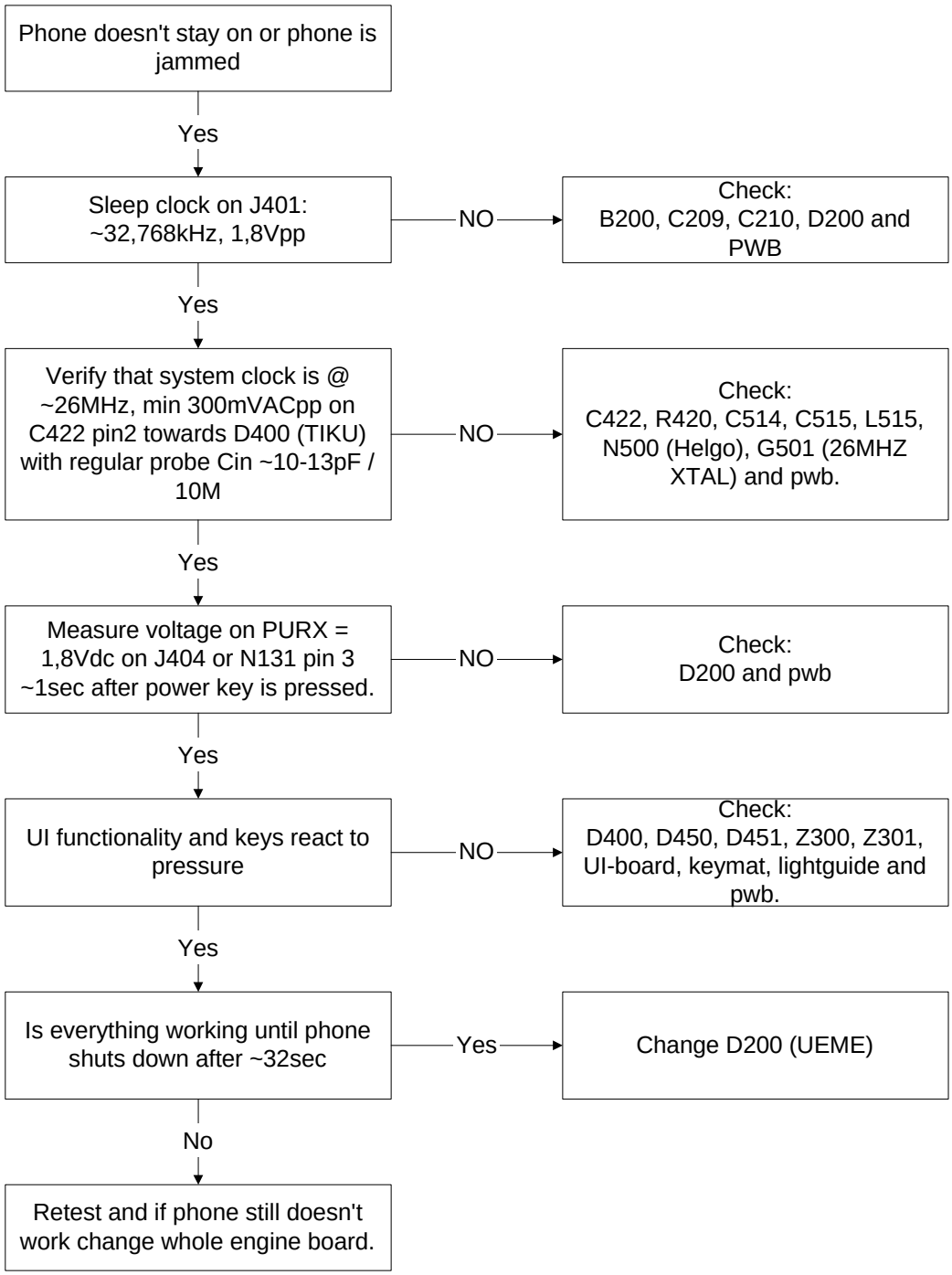
Phone doesn’t stay on, or phone is jammed

If this kind of a failure is presenting itself immediately after FLALI, it is most likely caused by ASICs missing contact with PWB.

If the MCU doesn’t service the watchdog register within the UEME, the operations watchdog runs out after approximately 32 seconds. It is not possible to measure this service routine.

Figure 3:Phone doesn’t stay on, or is jammed


Phone doesn't stay on or phone is jammed
Yes
Sleep clock on J401: ~32,768kHz, 1,8Vpp
NO
Check: B200, C209, C210, D200 and PWB
Yes
Verify that system clock is @ ~26MHz, min 300mVACpp on C422 pin2 towards D400 (TIKU) with regular probe Cin ~10-13pF / 10M
NO
Check: C422, R420, C514, C515, L515, N500 (Helgo), G501 (26MHZ XTAL) and pwb.
Yes
Measure voltage on PURX = 1,8Vdc on J404 or N131 pin 3 ~1sec after power key is pressed.
NO
Check: D200 and pwb
Yes
UI functionality and keys react to pressure
NO
Check: D400, D450, D451, Z300, Z301, UI-board, keymat, lightguide and pwb.
Yes
Is everything working until phone shuts down after ~32sec
Yes
Change D200 (UEME)
No
Retest and if phone still doesn't work change whole engine board.

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Display Information: “Contact Service”

When this error appears in the display it means that one or more of the internal baseband tests has failed. The baseband tests (self tests) are performed each time the phone is powered on. The self tests are divided into those performed while powering up (Start up tests) and the ones that can be executed with a PC using Phoenix (Runtime tests). The following Start-up tests are performed during power up:

Note: Phoenix Service Software may or may not include some or any of the tests mentioned here.

UEM CBUS IF TEST
SLEEP X LOOP TEST
AUX DA LOOP TEST
EAR DATA LOOP TEST
TX IDP LOOP TEST
TX IQ DP LOOP TEST
SIM CLK LOOP TEST
SIM IO CTRL LOOP TEST
MBUS RX TX LOOP TEST
BACKUP BATT TEST
RADIO TEST
WARRANTY TEST
PA TEMP TEST
SIM LOCK TEST
PPM VALIDITY TEST
KEYBOARD STUCK TEST
LPRF IF TEST
FLASH CHECKSUM TEST
CAMERA IF TEST
EXT RAM DATA BUS TEST
EXT RAM ADDR BUS TEST
NAND FLASH ID TEST
BT WAKEUP TEST
IR IF_TEST

If all these self tests are passed, the phone starts up.

From Phoenix it’s possible to run all the self tests and the additional “Runtime test”. The test cases can be seen below.

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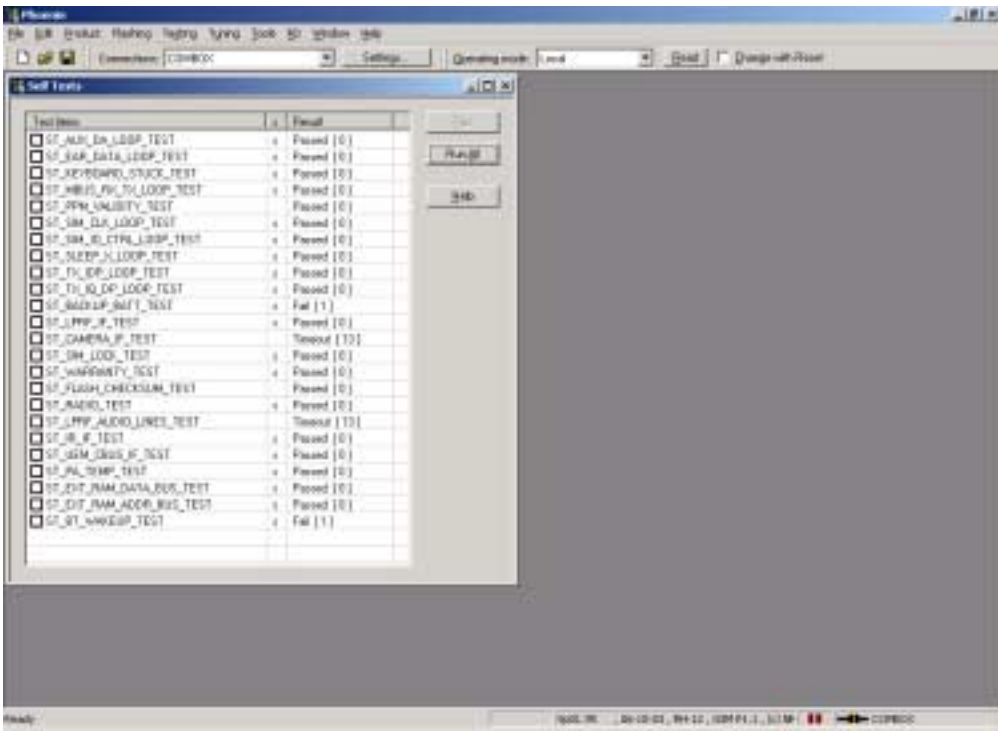
Figure 4:Display Information: “Contact Service”



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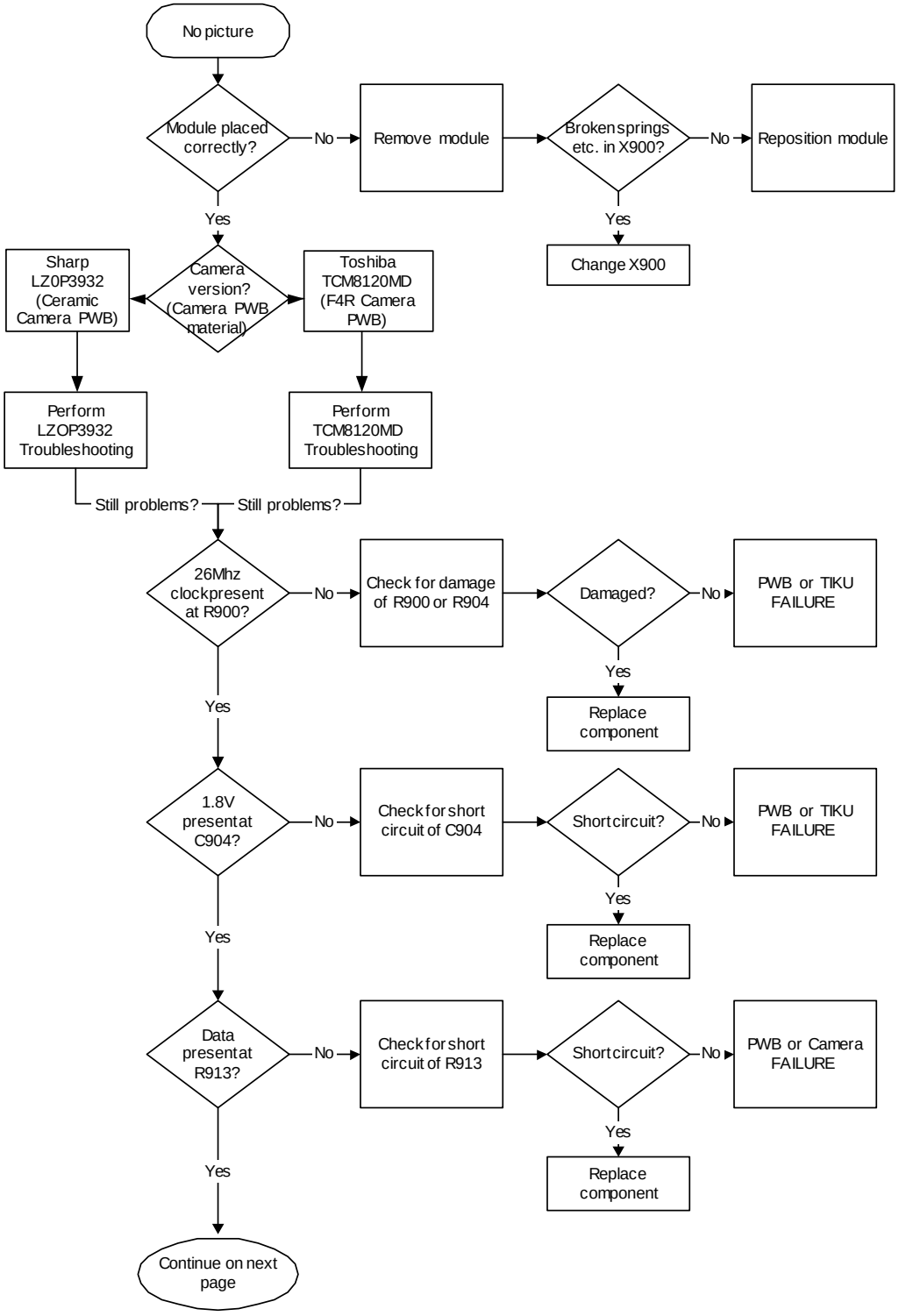
Function Failures

Camera Failure

No picture



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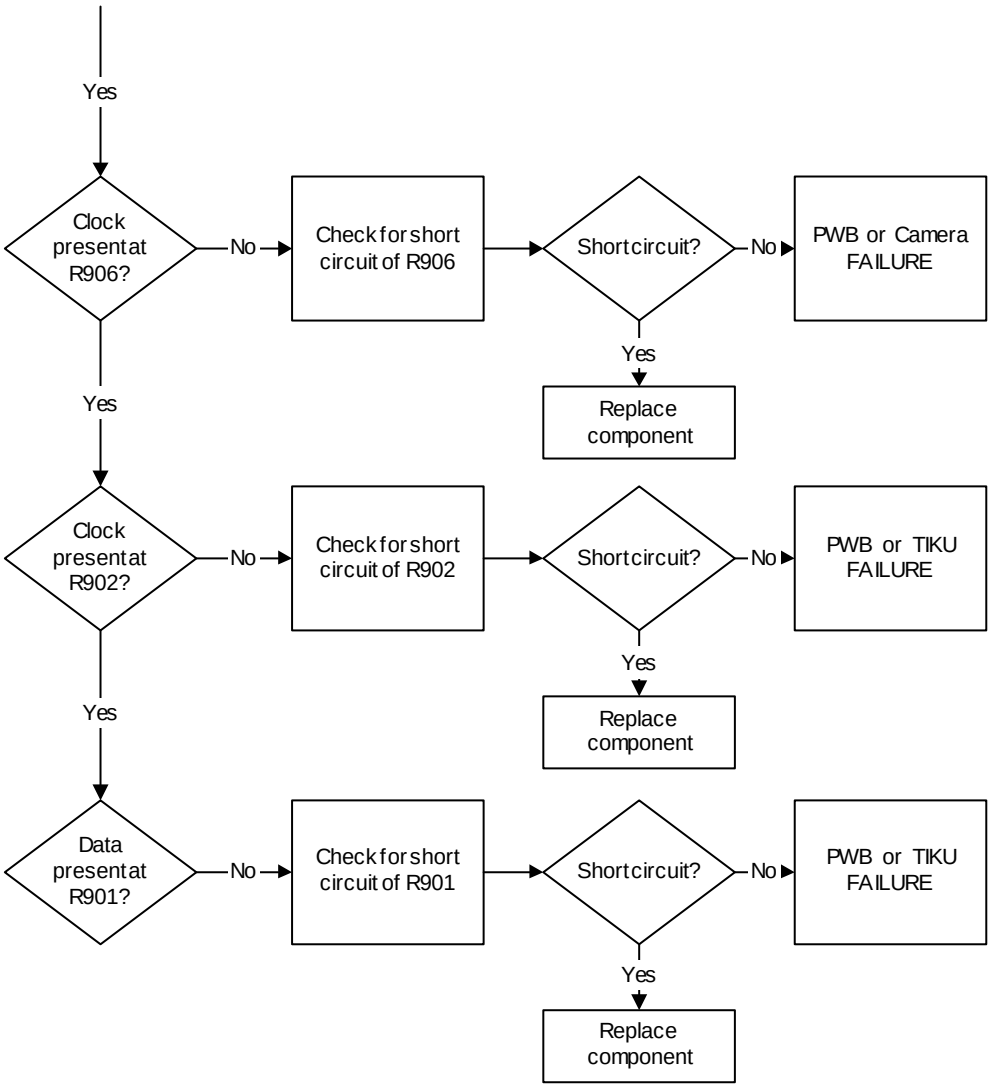

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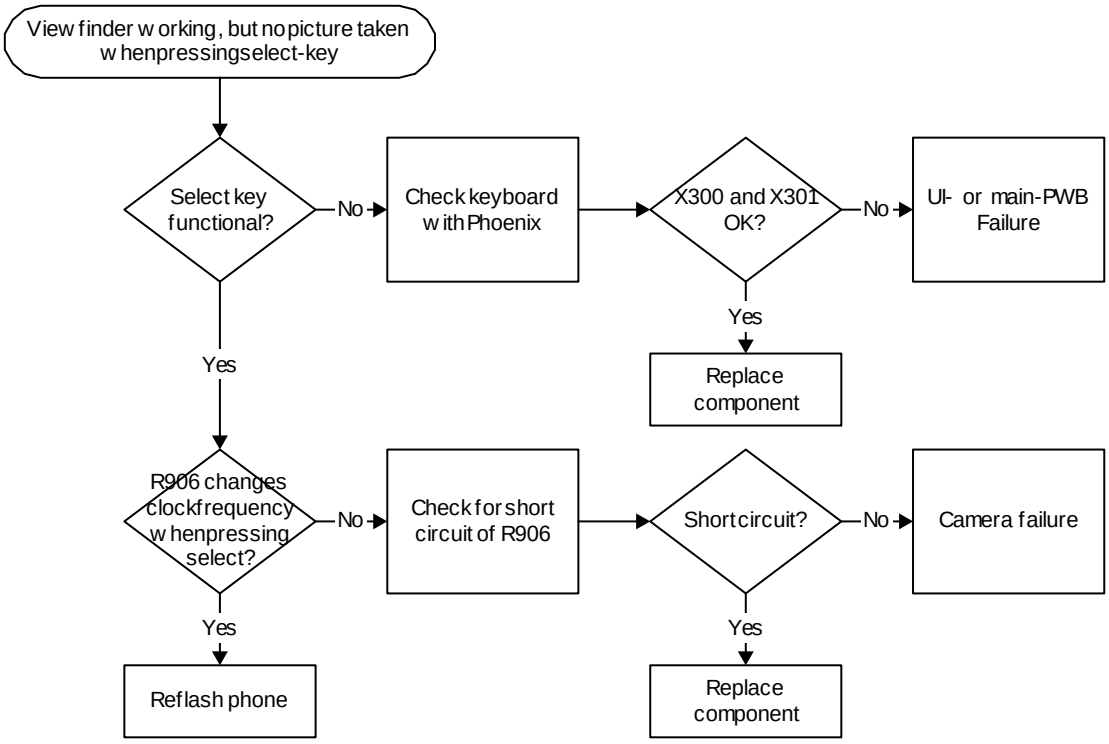
Viewfinder working but no picture taken when pressing select-key



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FM-radio Failure

The FM-radio troubleshooting guide is placed in the RF section.

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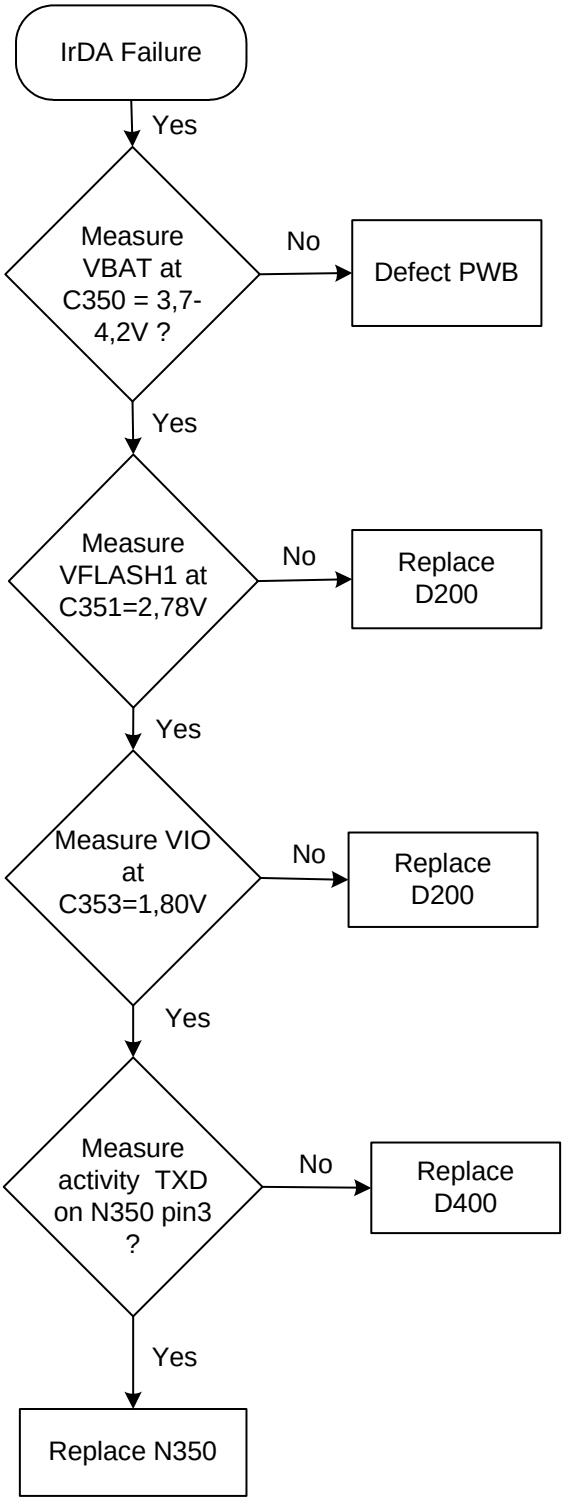
Infrared Communication Failure



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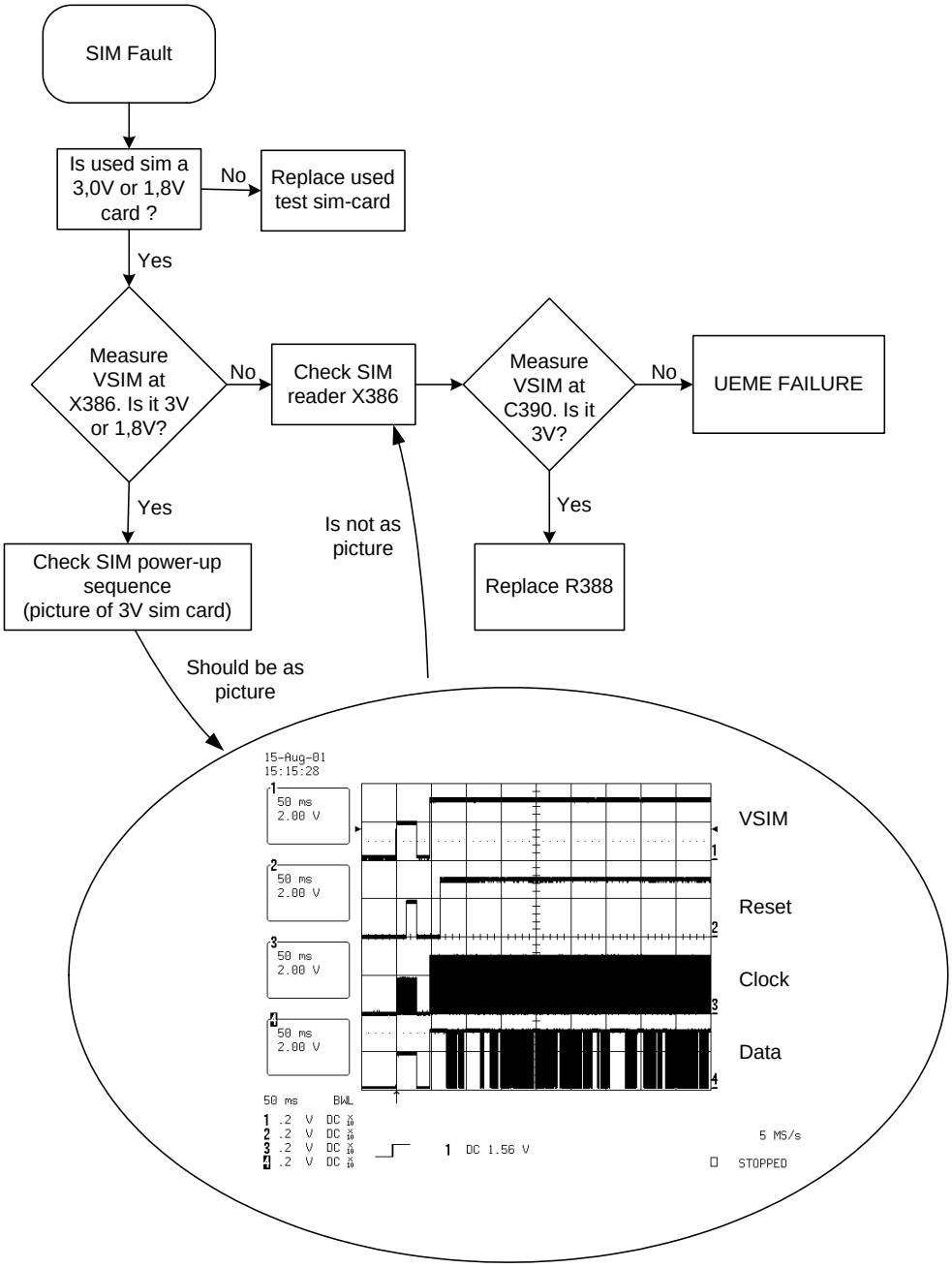
SIM Failure

The hardware of the SIM interface from the UEME (D200) to the SIM connector (X386) can be tested without a SIM card. When the power is switched on, the phone first checks for a 1,8V SIM card and then a 3V SIM card. The phone will try this four times, whereafter it displays "Insert SIM card".

The error ”SIM card rejected” means that the ATR message received from the SIM card is corrupted, e.g. data signal levels are wrong. The first data is always ATR and it is sent from card to phone.

Figure 5:SIM Failure



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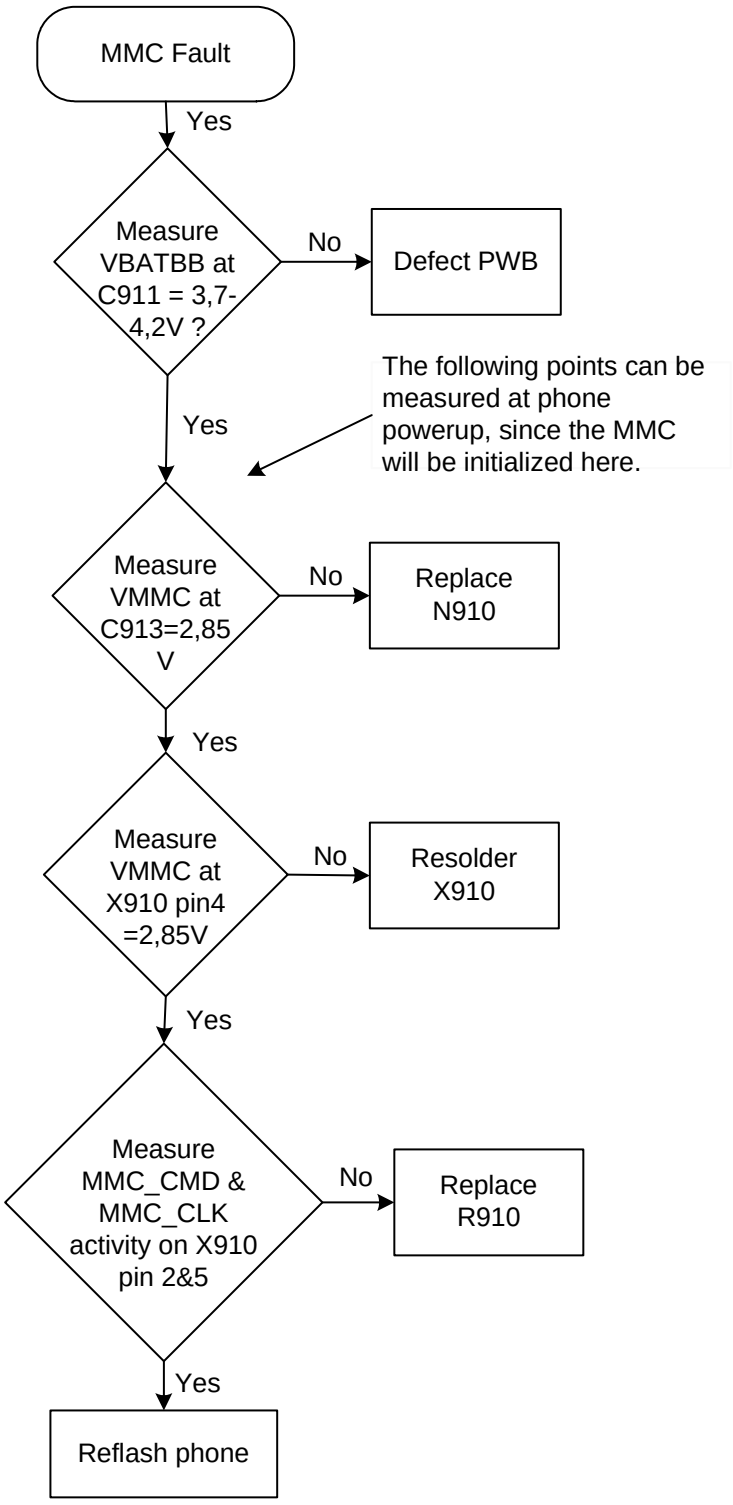
MMC Failure

The hardware of the MMC interface from the UEME (D200) to the MMC connector (X910) can't be tested without a MMC card. To be able to measure the following, solder wires on respective points.

Figure 6:MMC Failure



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Bluetooth Failure

The Bluetooth troubleshooting guide is placed in the RF section.

When the flash D450 or UEME has been replaced the IMEI has to be reprogrammed. This automatically includes reprogramming of the BT address.

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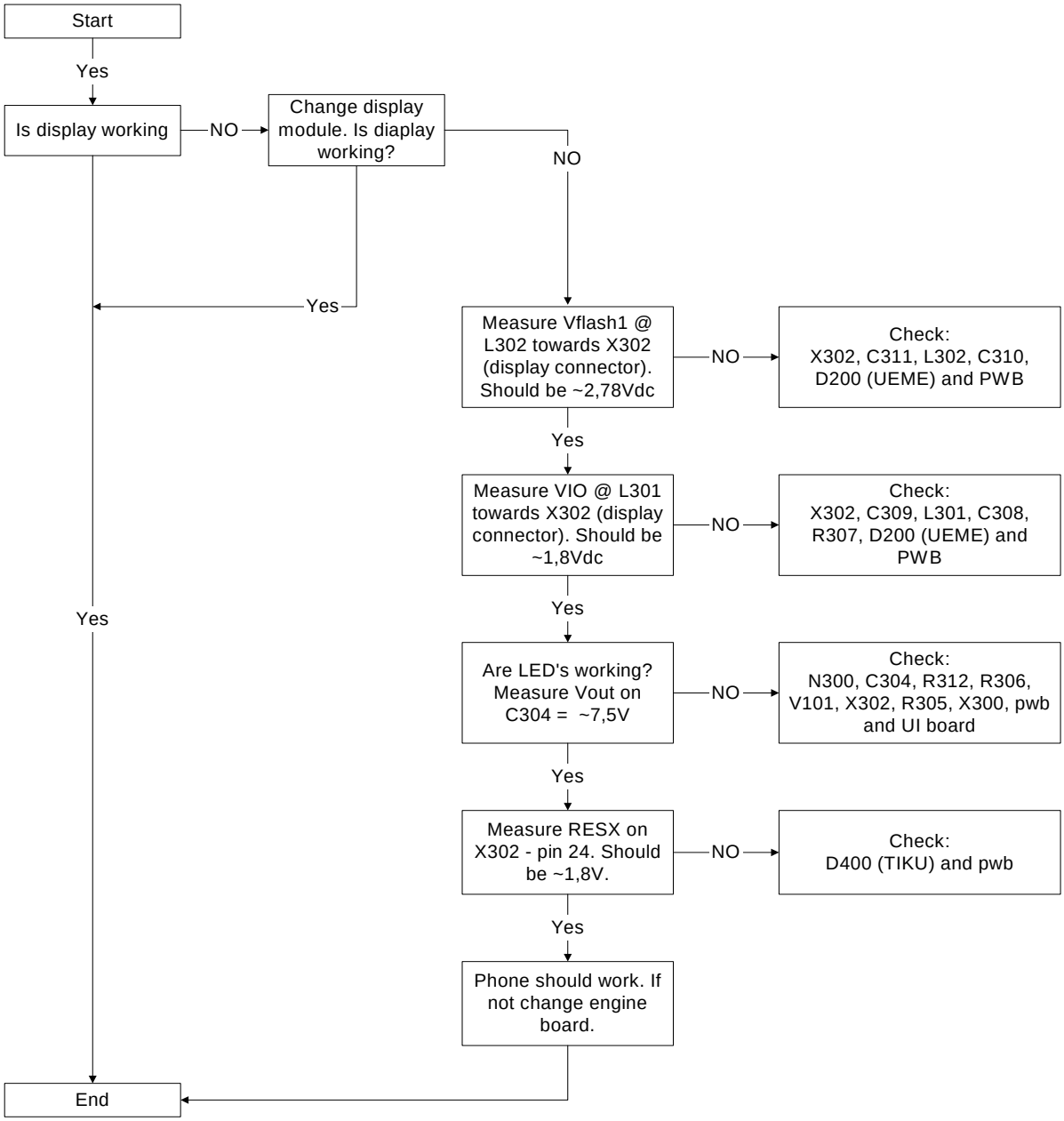
Display Failure


Start
Yes
Is display working
NO
Change display module. Is diaplay working?
NO
Yes
Measure Vflash1 @ L302 towards X302 (display connector). Should be ~2,78Vdc
NO
Check: X302, C311, L302, C310, D200 (UEME) and PWB
Yes
Measure VIO @ L301 towards X302 (display connector). Should be ~1,8Vdc
NO
Check: X302, C309, L301, C308, R307, D200 (UEME) and PWB
Yes
Yes
Are LED's working? Measure Vout on C304 = ~7,5V
NO
Check: N300, C304, R312, R306, V101, X302, R305, X300, pwb and UI board
Yes
Measure RESX on X302 - pin 24. Should be ~1,8V.
NO
Check: D400 (TIKU) and pwb
Yes
Phone should work. If not change engine board.
End

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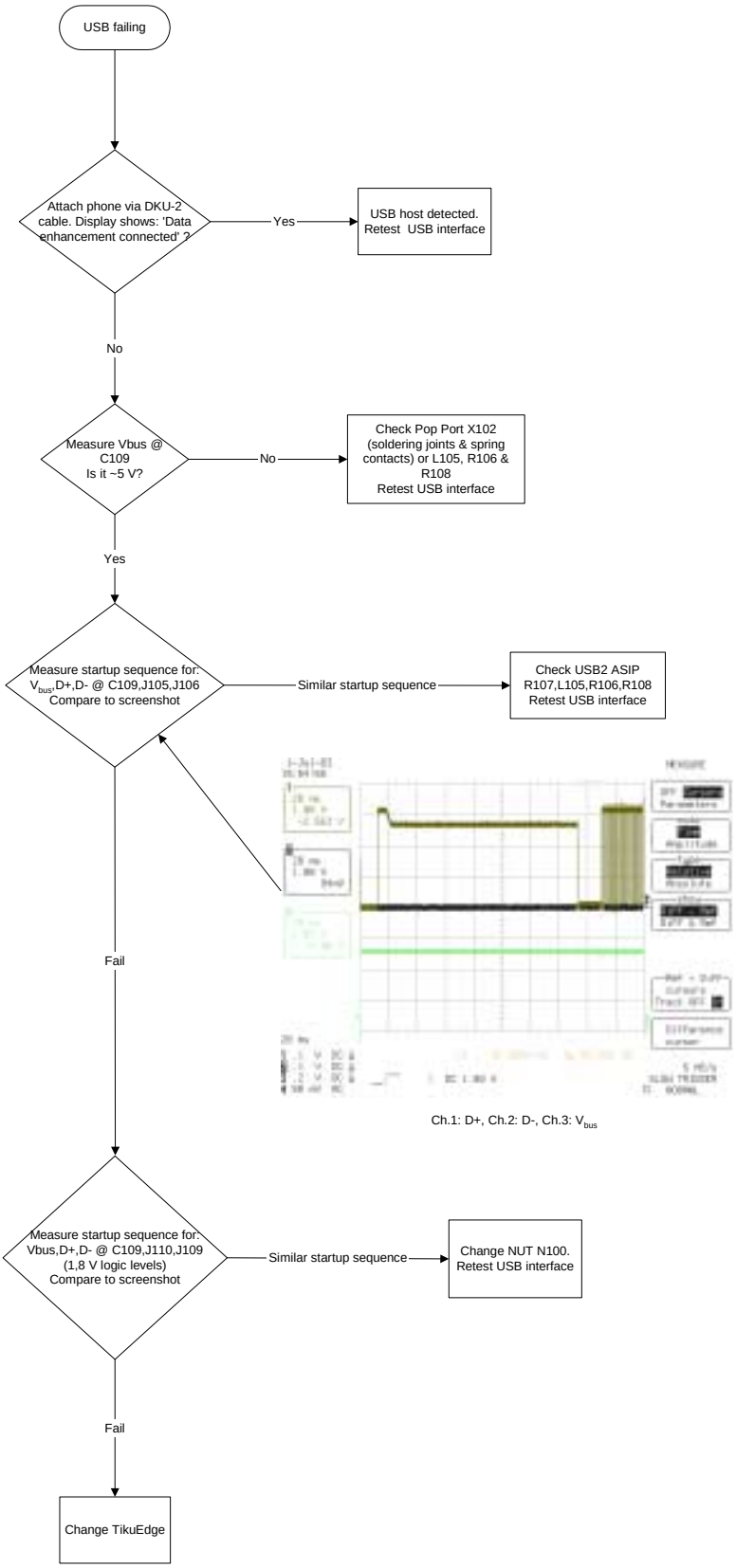
USB Data Transmission Failure


USB failing
Attach phone via DKU-2 cable. Display shows: 'Data enhancement connected' ?
Yes
USB host detected. Retest USB interface
No
Measure Vbus @ C109 Is it ~5 V?
No
Check Pop Port X102 (soldering joints & spring contacts) or L105, R106 & R108 Retest USB interface
Yes
Measure startup sequence for: Vbus,D+,D- @ C109,J105,J106 Compare to screenshot
Similar startup sequence
Check USB2 ASIP R107,L105,R106,R108 Retest USB interface
Fail
Measure startup sequence for: Vbus,D+,D- @ C109,J110,J109 (1,8 V logic levels) Compare to screenshot
Similar startup sequence
Change NUT N100. Retest USB interface
Fail
Change TikuEdge

Ch.1: D+, Ch.2: D-, Ch.3: V_{bus}

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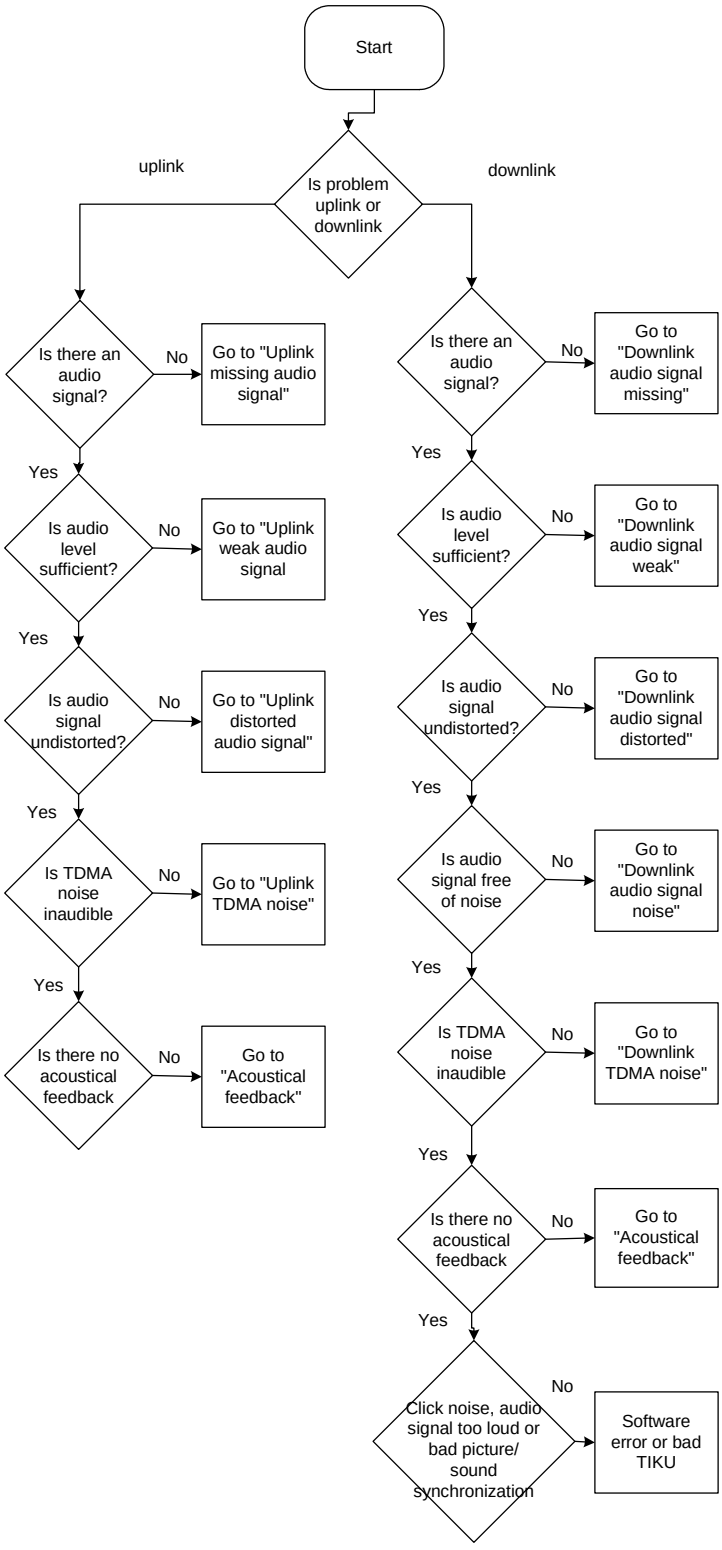
Audio Failure

Uplink or downlink failure



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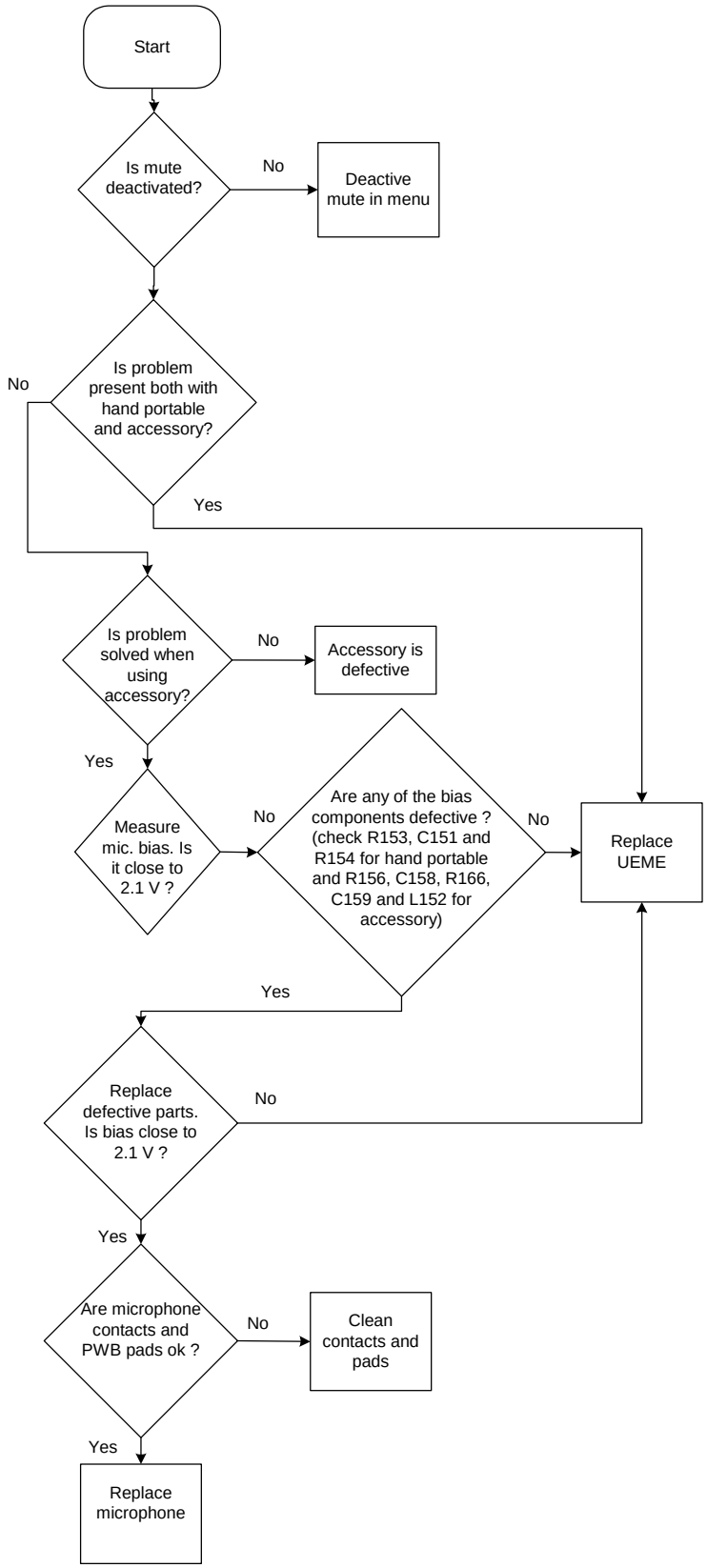
Uplink missing audio signal


Start
Is mute deactivated?
No
Deactive mute in menu
Is problem present both with hand portable and accessory?
No
Yes
Is problem solved when using accessory?
No
Accessory is defective
Yes
Measure mic. bias. Is it close to 2.1 V ?
No
Are any of the bias components defective ? (check R153, C151 and R154 for hand portable and R156, C158, R166, C159 and L152 for accessory)
No
Replace UEME
Yes
Replace defective parts. Is bias close to 2.1 V ?
No
Yes
Are microphone contacts and PWB pads ok ?
No
Clean contacts and pads
Yes
Replace microphone

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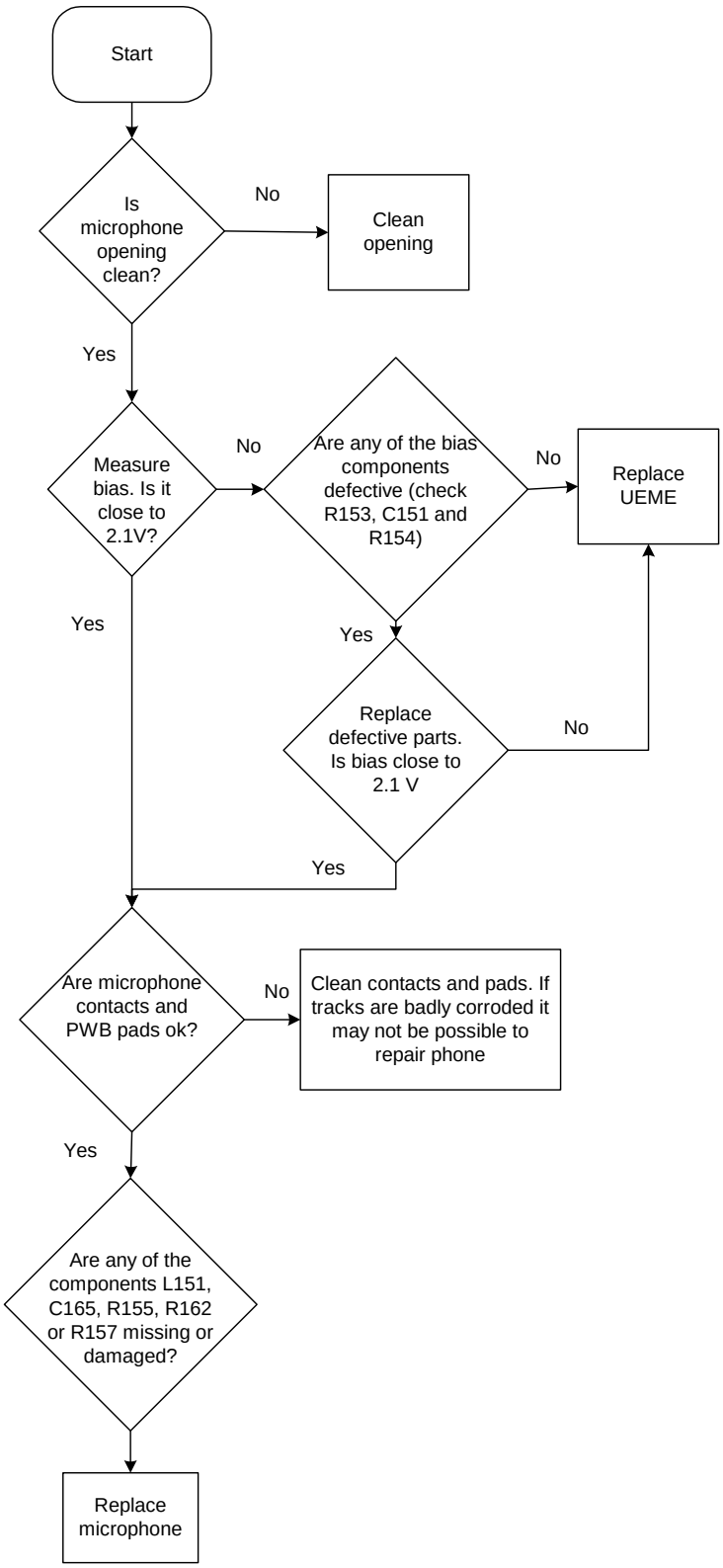
Uplink weak audio signal


Start
Is microphone opening clean?
No
Clean opening
Yes
Measure bias. Is it close to 2.1V?
No
Are any of the bias components defective (check R153, C151 and R154)
No
Replace UEME
Yes
Yes
Replace defective parts. Is bias close to 2.1 V
No
Yes
Are microphone contacts and PWB pads ok?
No
Clean contacts and pads. If tracks are badly corroded it may not be possible to repair phone
Yes
Are any of the components L151, C165, R155, R162 or R157 missing or damaged?
Replace microphone

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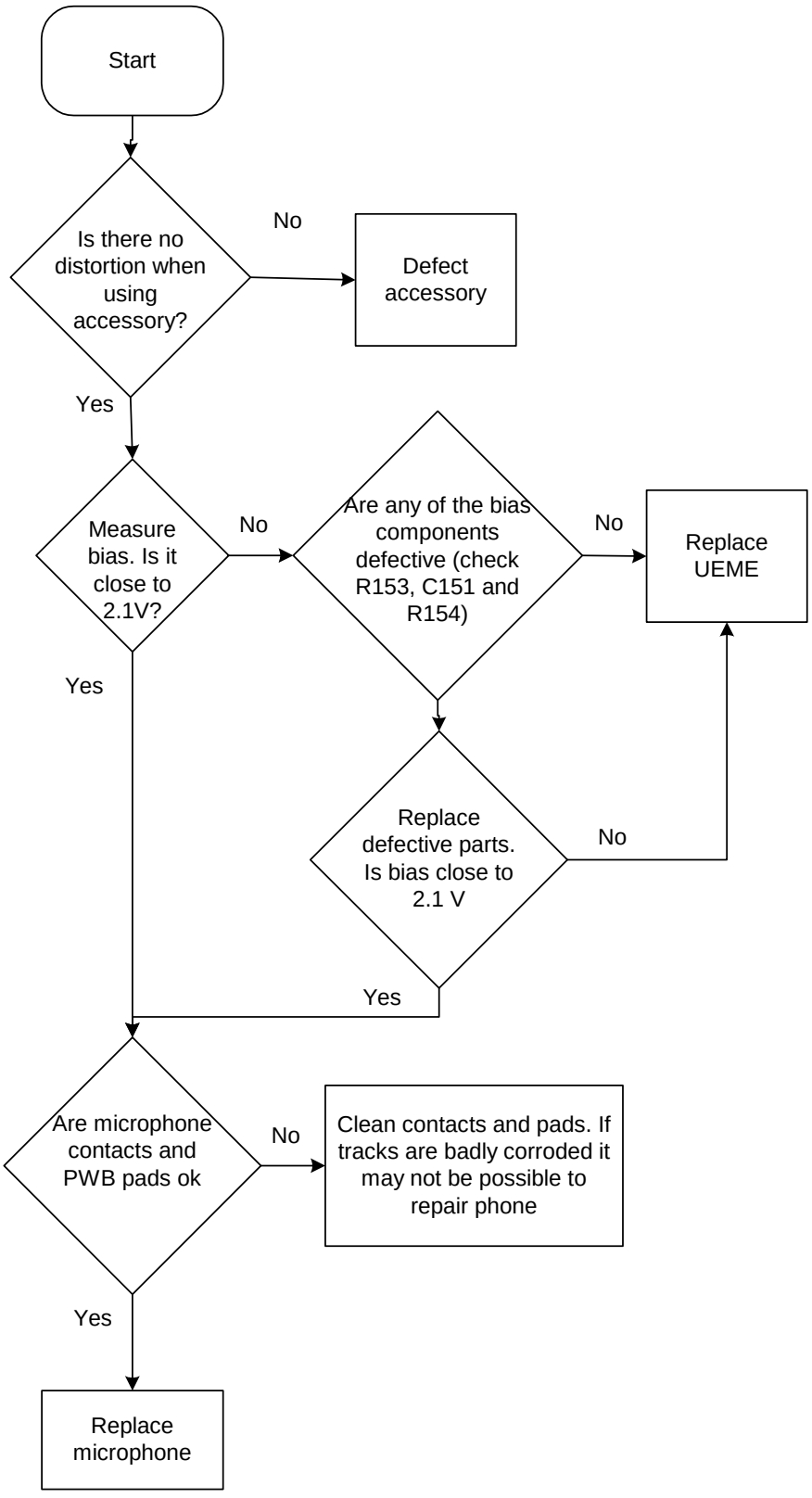
Uplink distorted audio signal



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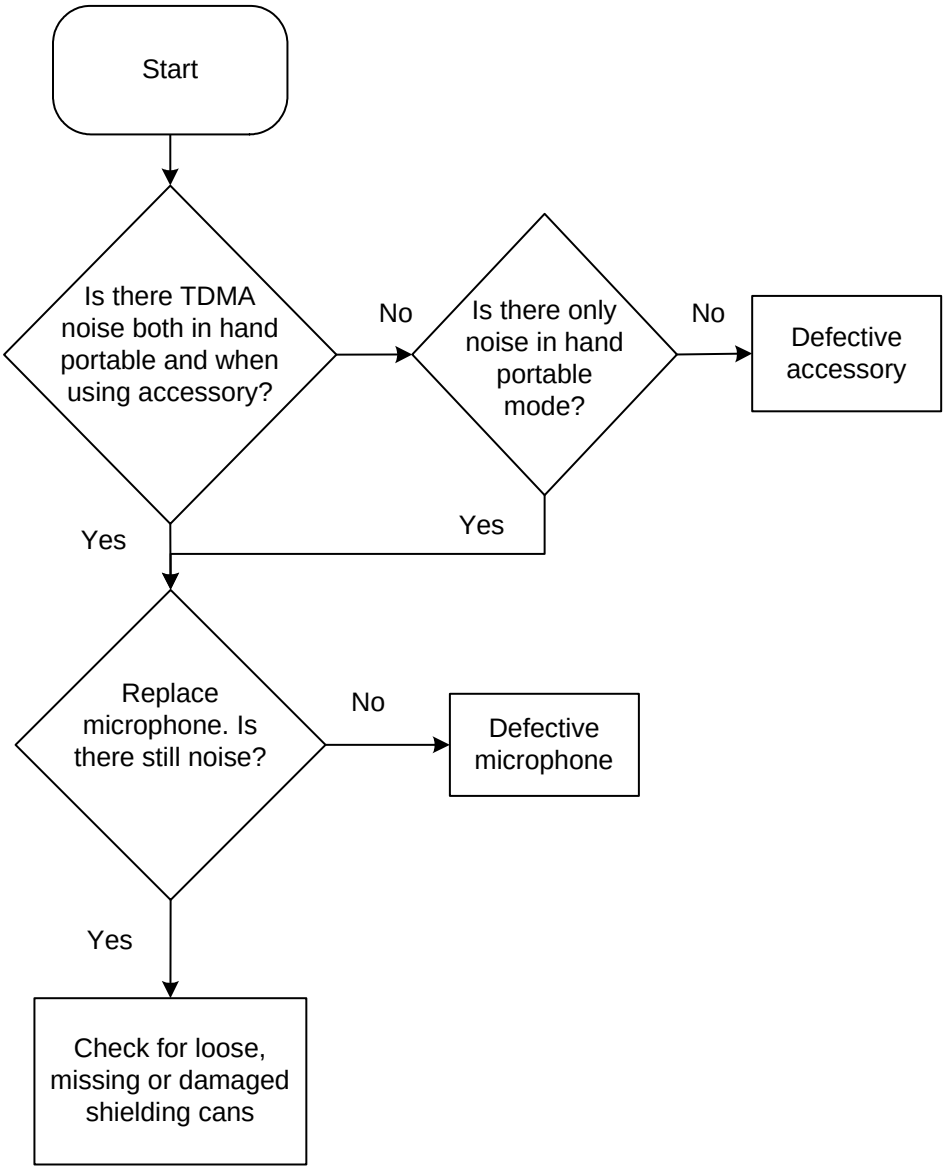
Uplink TDMA noise



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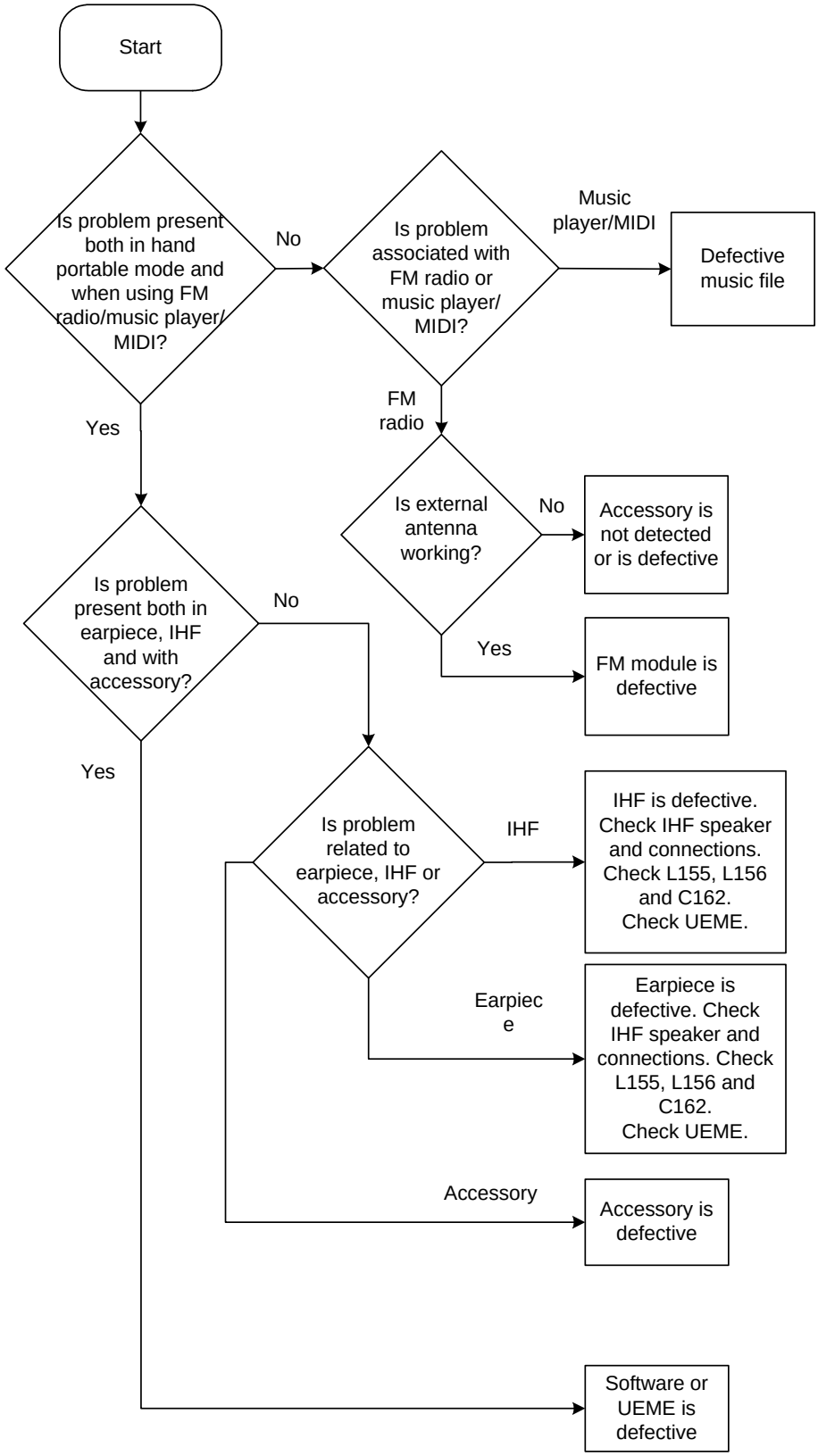
Downlink missing audio signal


Start
Is problem present both in hand portable mode and when using FM radio/music player/ MIDI?
No
Is problem associated with FM radio or music player/ MIDI?
Music player/MIDI
Defective music file
FM radio
Yes
Is external antenna working?
No
Accessory is not detected or is defective
Yes
FM module is defective
Is problem present both in earpiece, IHF and with accessory?
No
Yes
Is problem related to earpiece, IHF or accessory?
IHF
IHF is defective. Check IHF speaker and connections. Check L155, L156 and C162. Check UEME.
Earpiec e
Earpiece is defective. Check IHF speaker and connections. Check L155, L156 and C162. Check UEME.
Accessory
Accessory is defective
Software or UEME is defective

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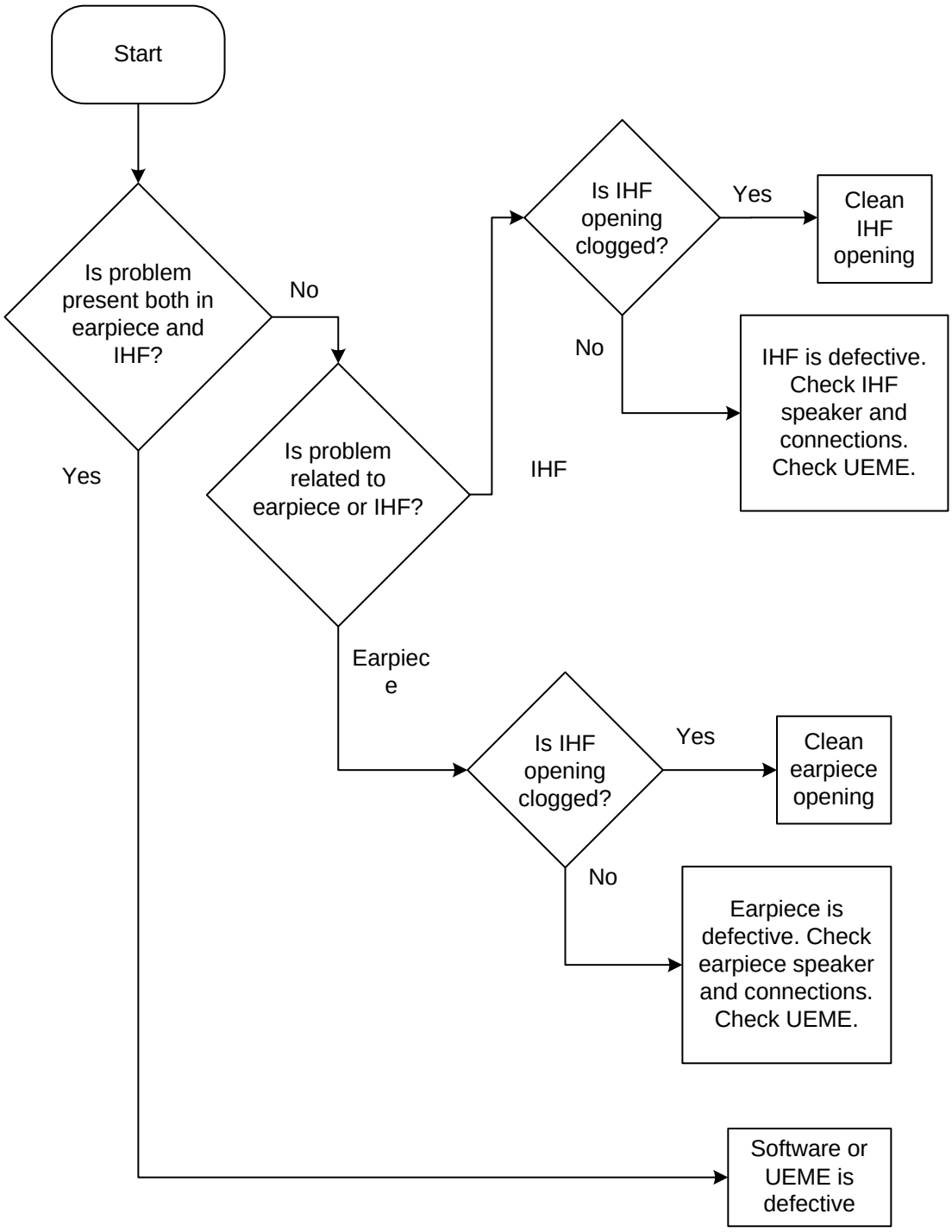
Downlink weak audio signal



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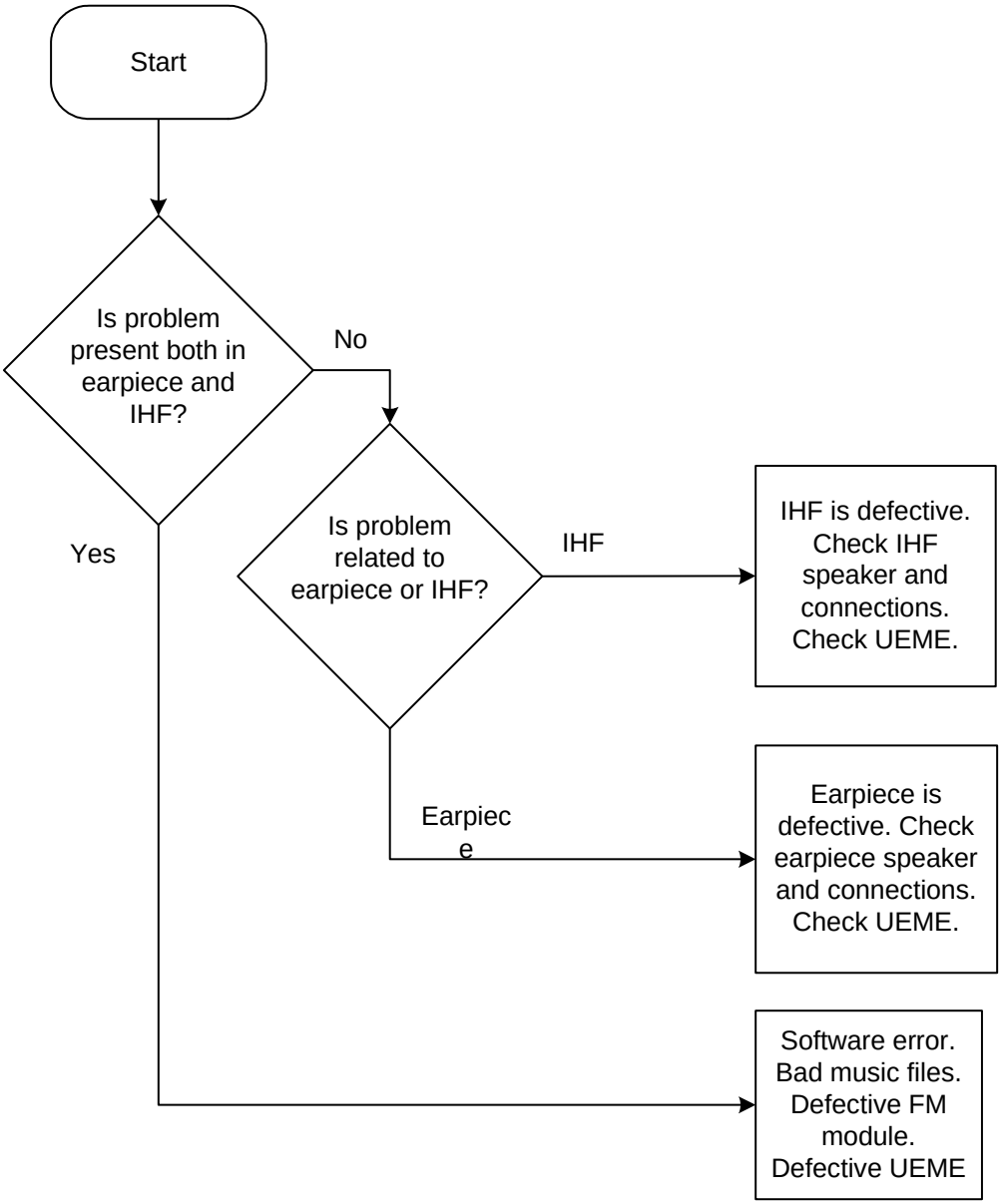
Downlink distorted audio signal


Start
Is problem present both in earpiece and IHF?
No
Yes
Is problem related to earpiece or IHF?
IHF
Earpiec e
IHF is defective. Check IHF speaker and connections. Check UEME.
Earpiece is defective. Check earpiece speaker and connections. Check UEME.
Software error. Bad music files. Defective FM module. Defective UEME

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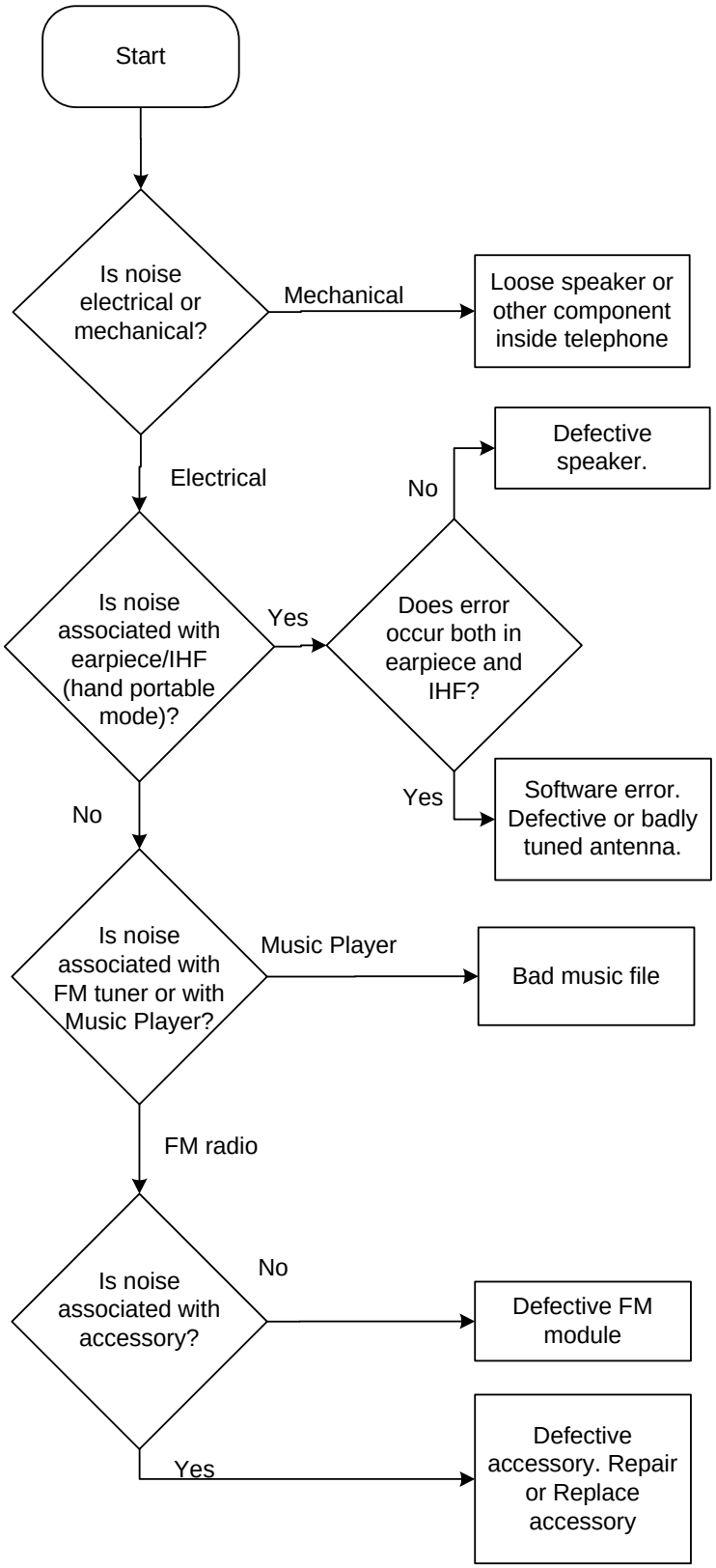
Downlink noise in audio signal



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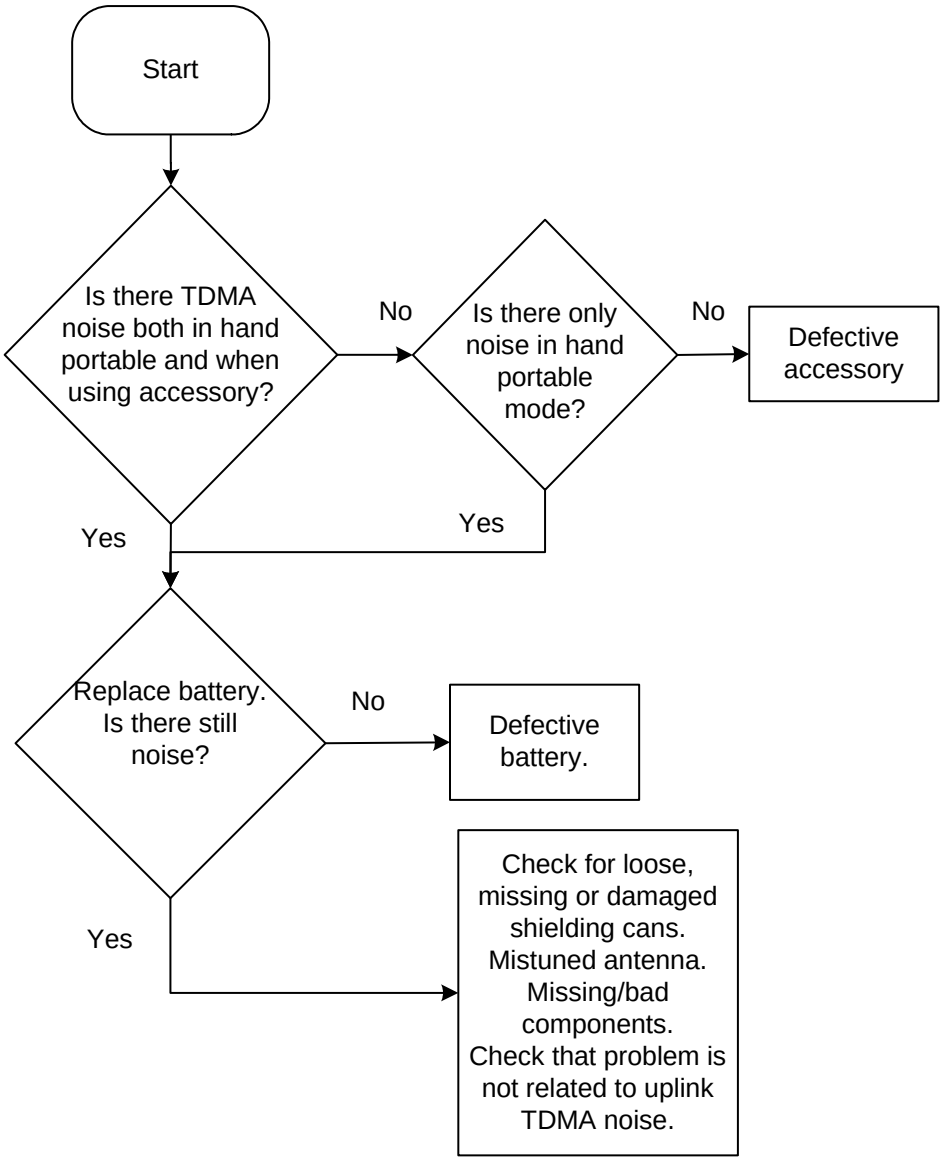
Downlink TDMA noise



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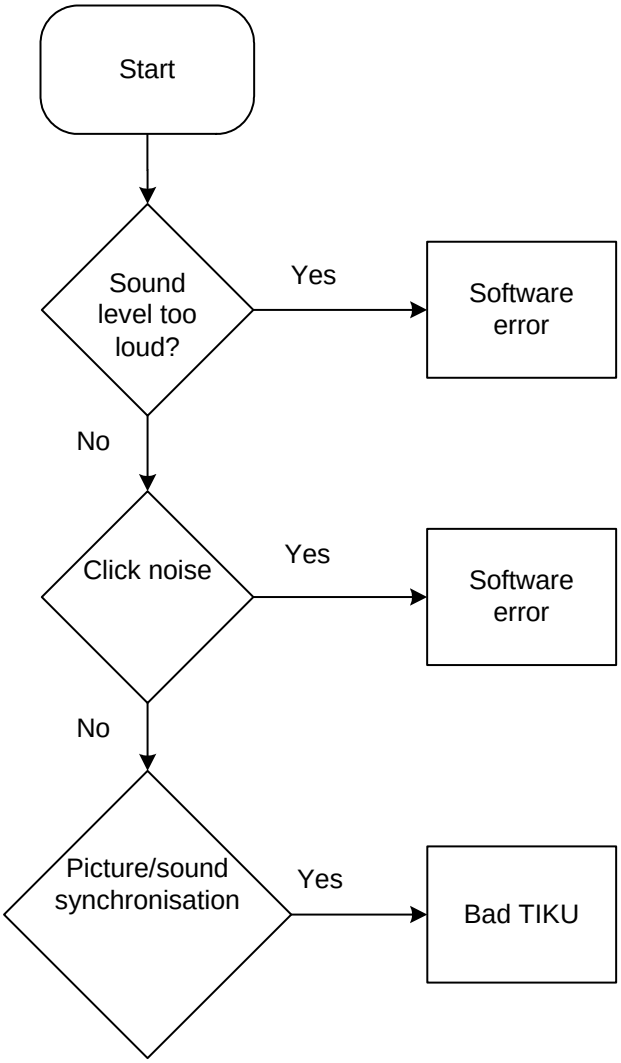
Various noise problems



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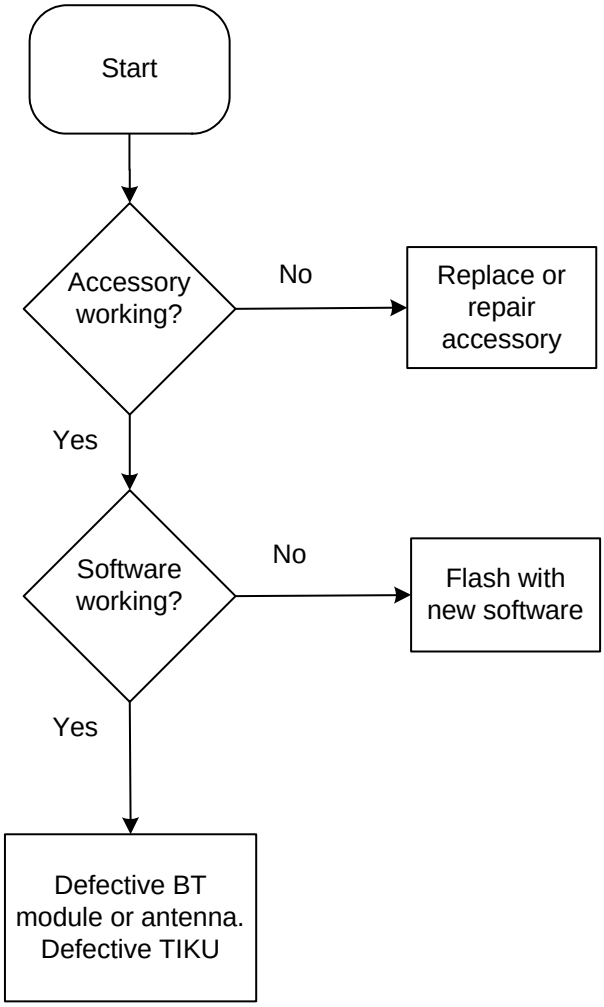
BT audio errors



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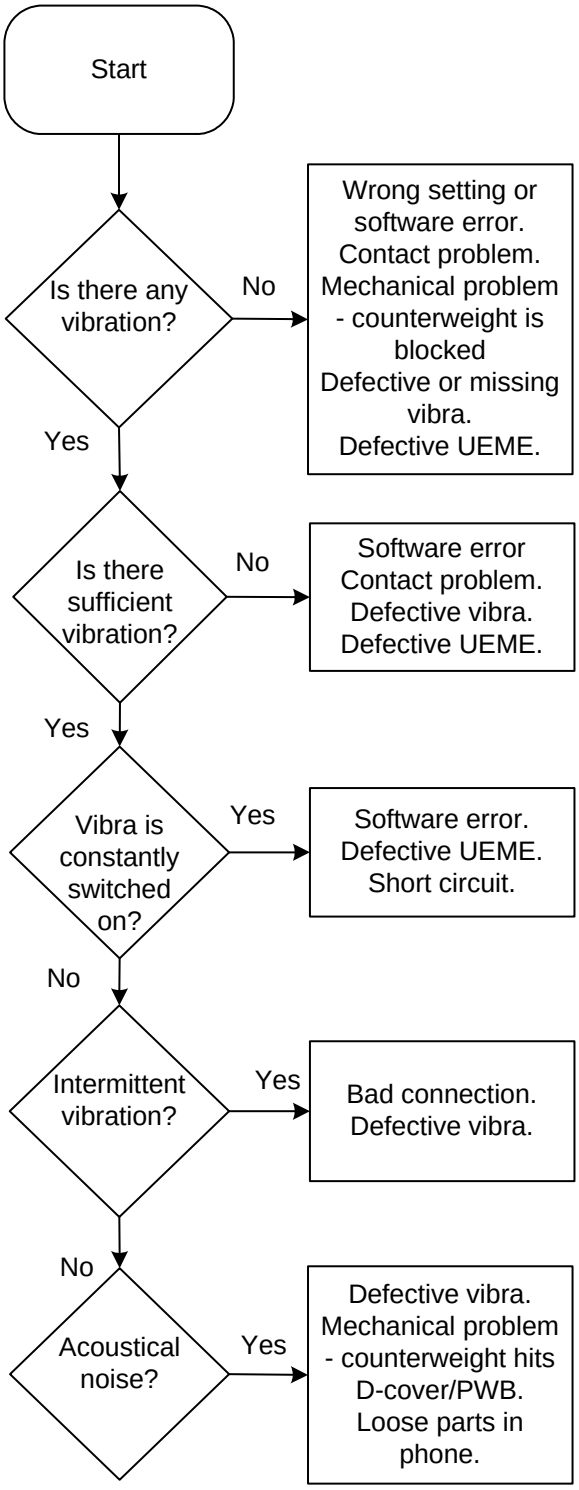
Vibra errors



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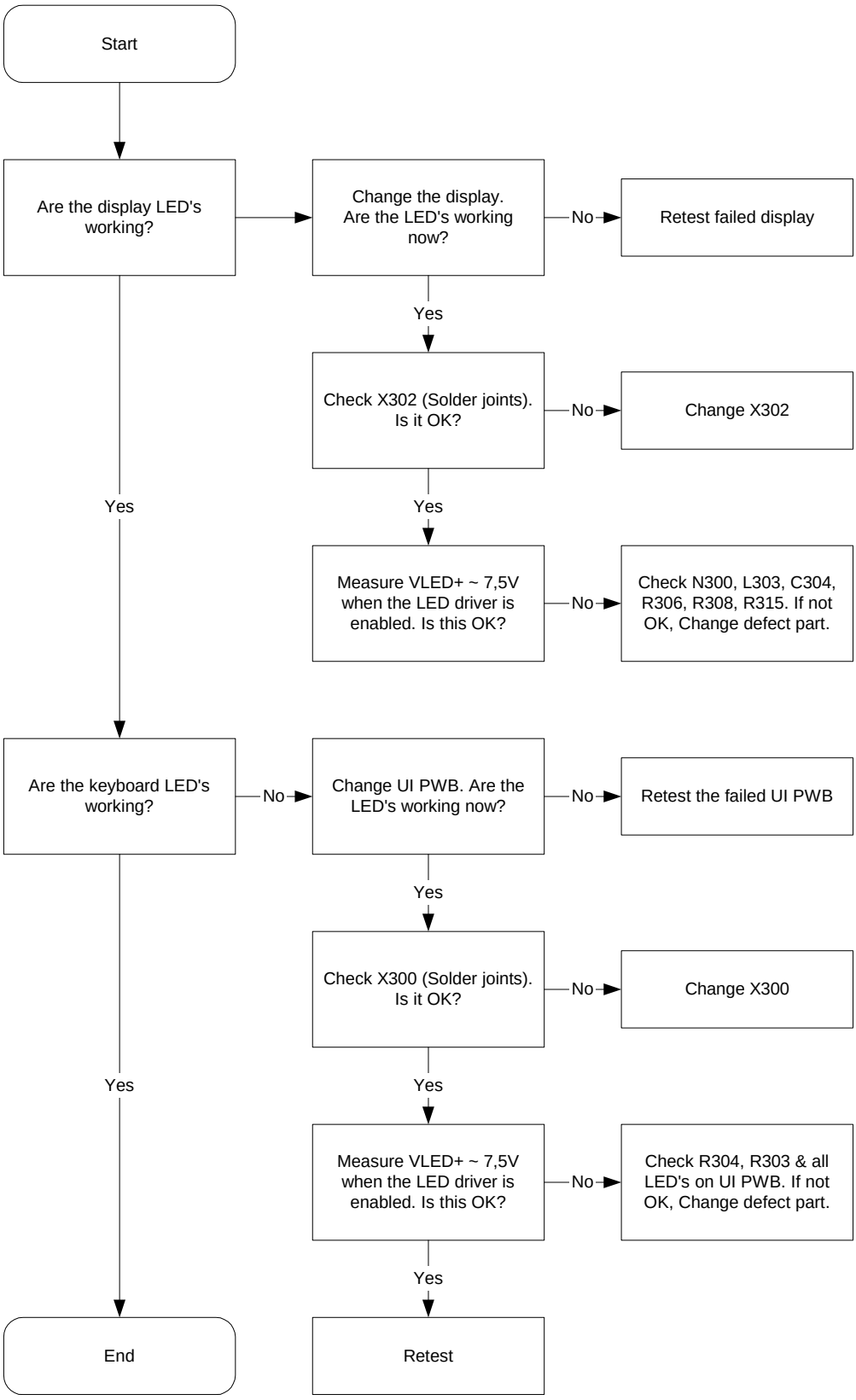
BackLight Failure


Start
Are the display LED's working?
Change the display. Are the LED's working now?
No
Retest failed display
Yes
Check X302 (Solder joints). Is it OK?
No
Change X302
Yes
Measure VLED+ ~ 7,5V when the LED driver is enabled. Is this OK?
No
Check N300, L303, C304, R306, R308, R315. If not OK, Change defect part.
Yes
Are the keyboard LED's working?
No
Change UI PWB. Are the LED's working now?
No
Retest the failed UI PWB
Yes
Check X300 (Solder joints). Is it OK?
No
Change X300
Yes
Measure VLED+ ~ 7,5V when the LED driver is enabled. Is this OK?
No
Check R304, R303 & all LED's on UI PWB. If not OK, Change defect part.
Yes
End
Retest

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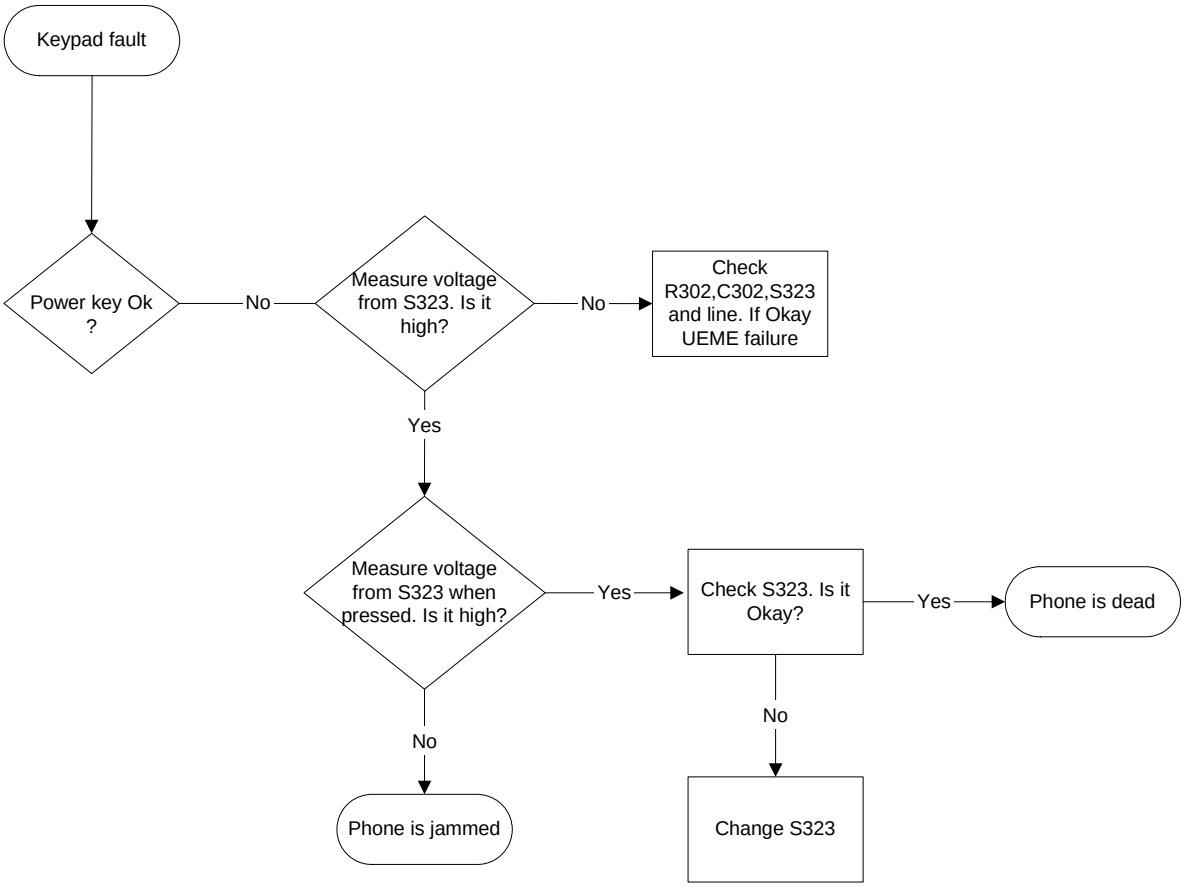
Key Failure

Power Key Failure



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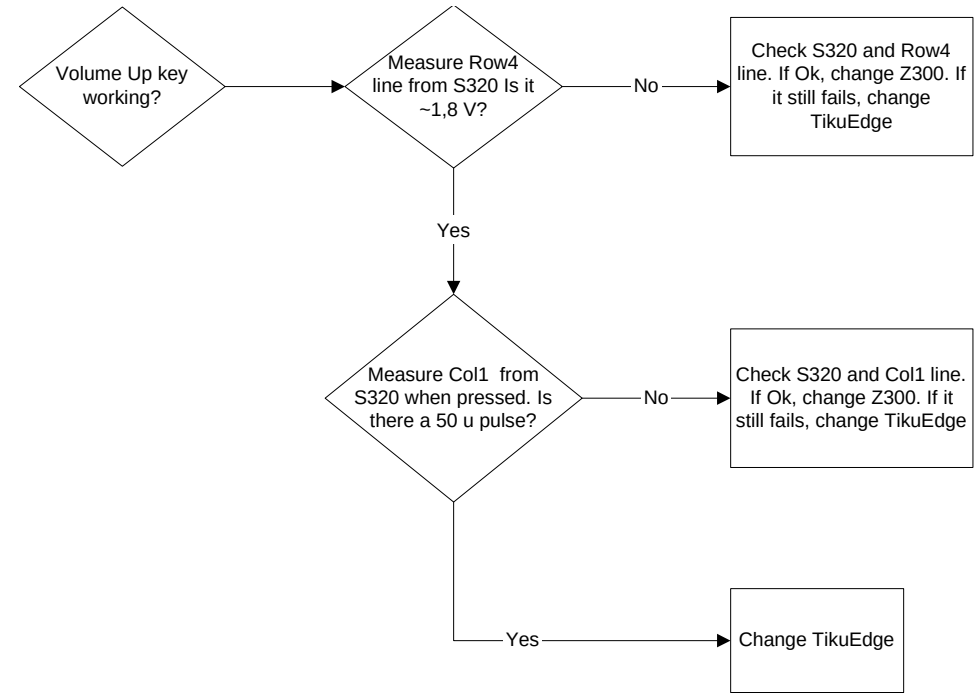
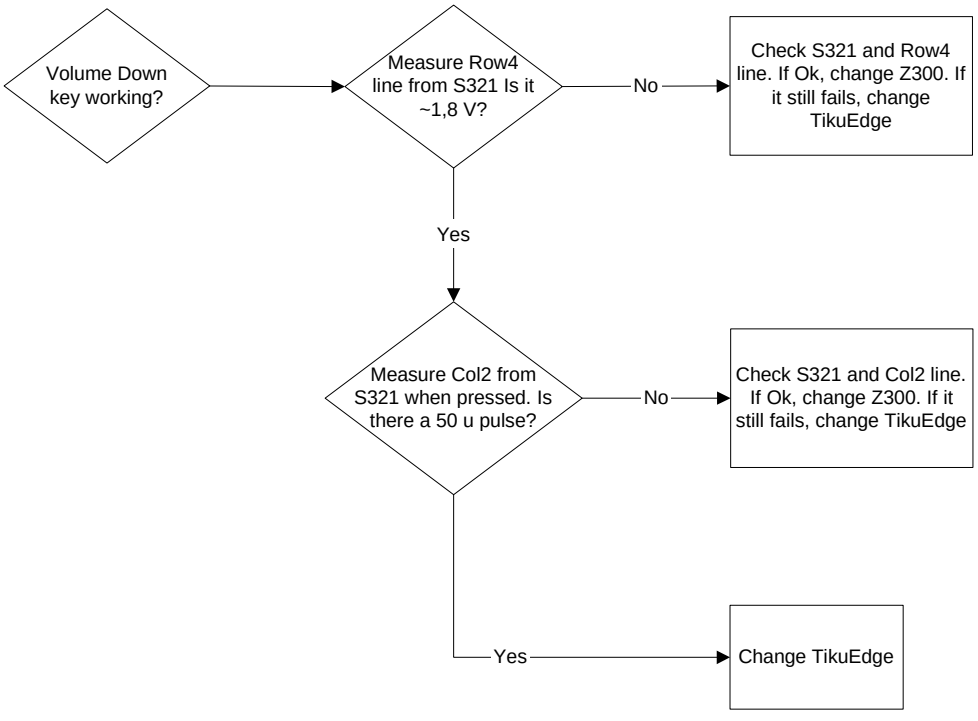
Volume Key Failure


Volume Up key working?
Measure Row4 line from S320 Is it ~1,8 V?
No
Check S320 and Row4 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Measure Col1 from S320 when pressed. Is there a 50 u pulse?
No
Check S320 and Col1 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Change TikuEdge


Volume Down key working?
Measure Row4 line from S321 Is it ~1,8 V?
No
Check S321 and Row4 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Measure Col2 from S321 when pressed. Is there a 50 u pulse?
No
Check S321 and Col2 line. If Ok, change Z300. If it still fails, change TikuEdge
Yes
Change TikuEdge

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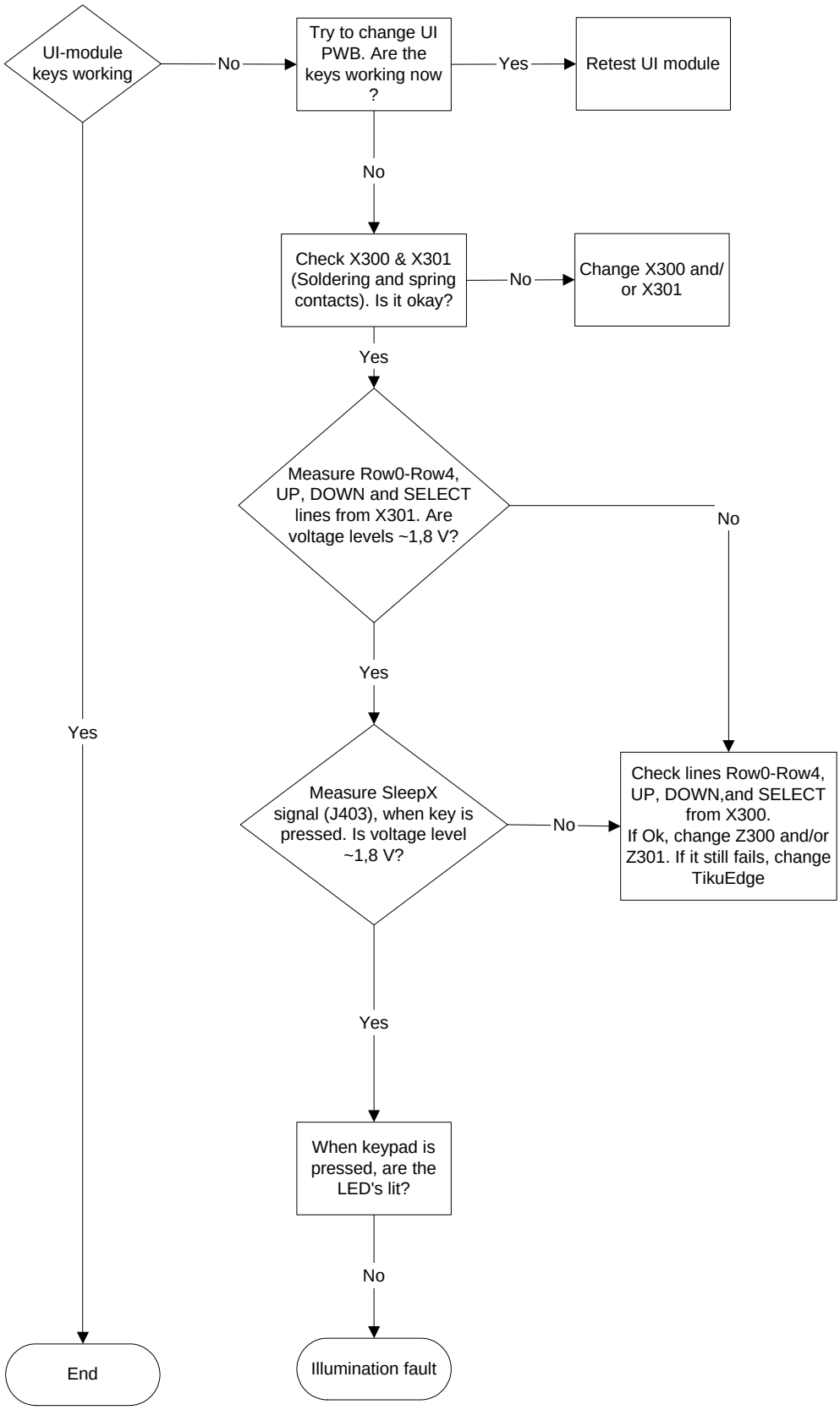
UI module keys working


UI-module keys working
No
Try to change UI PWB. Are the keys working now ?
Yes
Retest UI module
No
Check X300 & X301 (Soldering and spring contacts). Is it okay?
No
Change X300 and/ or X301
Yes
Measure Row0-Row4, UP, DOWN and SELECT lines from X301. Are voltage levels ~1,8 V?
No
Yes
Yes
Measure SleepX signal (J403), when key is pressed. Is voltage level ~1,8 V?
No
Check lines Row0-Row4, UP, DOWN,and SELECT from X300.
If Ok, change Z300 and/or Z301. If it still fails, change TikuEdge
Yes
When keypad is pressed, are the LED's lit?
No
End
Illumination fault

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Nokia Customer Care

6(b) - RF Troubleshooting Instructions

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Introduction

This document is the troubleshooting guide for RM-72. On the following pages you will find a step-by-step fault finding procedure and reference measurements at the relevant signal points.

Notes on reference measurements

- LF & DC signals are measured with Textronix 100 MHz Scope (TDS3014) and P3010 13pF probe.
- RF signals are measured with R&S FSIQ 7GHz Spectrum Analyzer and Agilent resistive divider probe (10dB, 500ohm).
- Please be aware that the RF connector on service adaptor is leaking power (into air) and acts as noise source when probing on RX chain. In 1800 band the problem is most severe while there is no external LNA to amplify the signal above the noise level like in the 1900 band. In 900/850 band the leakage is not as high due to lower frequency.
- GSM SA settings: RBW=500kHz, VBW=500kHz.
- Bluetooth SA settings: RBW=2MHz, VBW=2MHz.
- All reference measurements were made on a RM-72 phone (GSM900).
- RF loss Module Repair Jig: 0.3dB (low bands), 0.4dB (high bands).
- RF loss RF Adaptor: 0.4dB (low band), 0.7dB (high bands).

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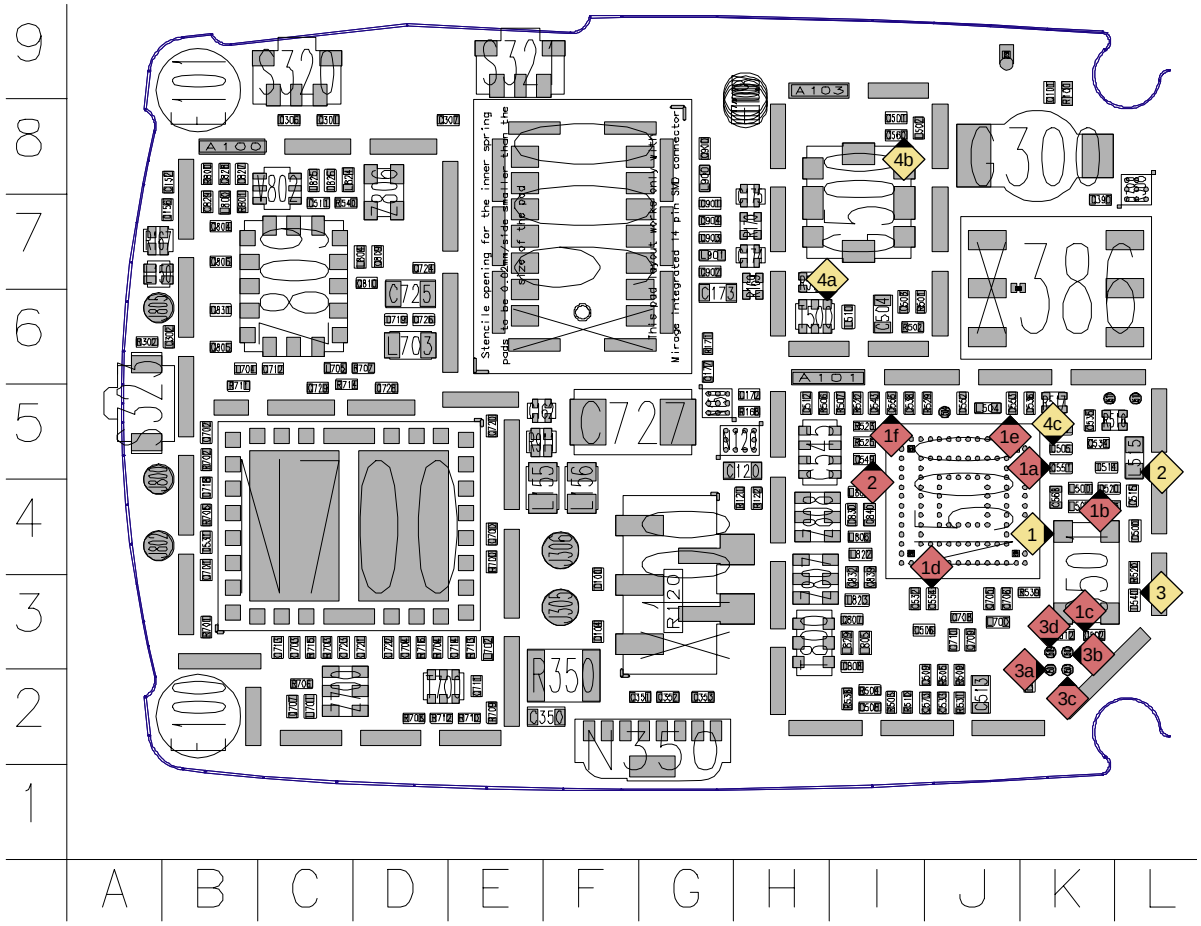
Helgo / Synthesizer Troubleshooting



N500 Helgo troubleshooting
Phoenix: RF local burst Rx mode.

1. Measure N500 Helgo supply voltages a) *VR1* (C551) b) *VR2* (C520) c) *VR3* (C503) d) *VR4* (C554) e) *VR5* (C553) f) *VR6* (C555) and g) VR7 (C297 located BB bottom grid S3). All voltages = 2,8 V except *VR1* = 4,75 V.
2. Measure N500 Helgo reference voltage *VrefRF01* = 1,35 V (C549).
3. Measure N500 Helgo serial bus signals a) *RfbusClk* (J501) b) *RFbusEna1* (J502) c) *Reset* (J503) and d) *RFBusData* (J509). All measured in burst mode. Logic high level is 1,8 V.

- If FAIL check baseband

Synthesizer troubleshooting
Phoenix: RF local mode Rx continuous
Frequency = 3590,4 MHz @ ch. 38

1. Measure G501 VCTCXO output voltage = 26 MHz 600 mVpp(G501 pin 3).
2. Measure N500 26 MHz reference output voltage = 800 mVpp (L515).
3. Measure G501 VCTCXO AFC voltage (C540).
4. Measure a) RF frequency and level (T500). Place probe through hole in shield in shield!
   - If no frequency is found within the 3-4 GHz span then measure b) VCO supply voltage = 2,8V (C560). If supply is OK then replace VCO.
   - If wrong frequencies are found then measure c) VCO control voltage at C505. If voltage is 4,8V it is most likely that the VCO does not work or the control loop is open. check C503, R501, R502, C504, C505.
   - If the right frequency is found the synthesizer is OK.

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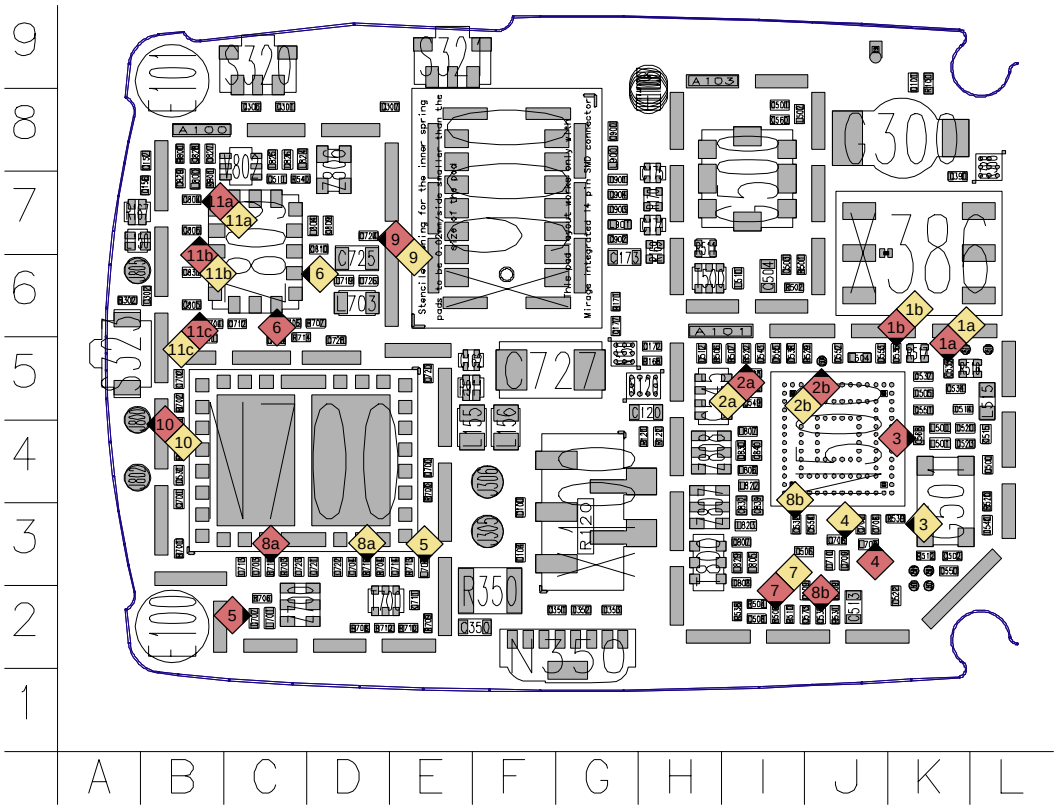
Tx Troubleshooting



Tx 850/900 GMSK troubleshooting
Apply a 50 Ω load at the antenna connector of the jig.
GSM850 ch. 190 = 836,6 MHz, burst mode power level 10.
GSM900 ch. 37 = 897,4 MHz, burst mode power level 10.
Spectrum analyzer: RBW = 500 kHz and VBW = 500 kHz, center = 500 kHz and span = 20 MHz.

1. Measure voltage of a) *TXI* (C535) and b) *TXQ* (C536). *TXI* and *TXQ* = 500 mVpp min. and 1,2 VDC during the burst.
2. Measure a) *TXC* = 950 mV during burst (R522) and b) *TXP* = 1,8V during burst (J504). Note: *TXC* voltage is a function of power level.
3. Measure modulator supply voltage *VR2* = 2,7 V (C568, both terminals).
- If FAIL check baseband
4. Measure RF level = -13 dBm at input of Z700 SAW-filter (L700). If FAIL check N500 Helgo.
5. Measure RF level = -13 dBm at N700 PA-input (C707). If FAIL check Z700 Tx SAW.
6. Measure RF level = +7 dBm at N700 PA output *TX_OUT_EGSM* (Z809). If OK go to 10.
7. Measure N700 PA power detector *DET* = 850 mV during burst (R503). Note: *DET* voltage is a function of output power.
8. Measure N700 PA control voltage a) *VPCTRL_G* = 1,2 V during burst (R715) and N700 PA bias voltage b)*VTXB_G*= 2,7V (C533). Note: *VPCTRL_G* voltage is a function of power level
9. Measure N700 PA supply voltage *VBAT* (C724).
10. Measure RF level = 2 dBm at antenna pad *J800*.
11. Measure Z809 antenna switch control signal voltages a) *VANT_1* = 0 V (C804), b) *VANT_2* = 0 V (C806) and c) *VANT_3* = 2,7 V (C805).

Tx 1800/1900 GMSK troubleshooting.
Apply a 50 Ω load at the antenna connector of the jig.
GSM1800 ch. 700 = 1747,8 MHz, burst mode power level 5.
GSM1900 ch. 661 = 1880,0 MHz, burst mode power level 5.
Spectrum analyzer: RBW = 500 kHz and VBW = 500 kHz, center = 500 kHz and span = 20 MHz.

1. Measure voltage of a) *TXI* (C535) and b) *TXQ* (C536). *TXI* and *TXQ* = 500 mVpp min. and 1,2 VDC during the burst.
2. Measure a) *TXC* = 900 mV during burst (R522) and b) *TXP* = 1,8 V during burst (J504). Note: *TXC* voltage is a function of power level.
3. Measure modulator supply voltage *VR2* = 2,7 V (R539).
- If FAIL check baseband.
4. Measure RF level = -15 dBm at input of T700 Tx balun (C709). If FAIL check N500 Helgo.
5. Measure RF level = -20 dBm at PA-input (L702). If FAIL check T700 Tx balun.
6. Measure RF level = -3 dBm at N700 PA output *TX_OUT_DCS* (Z809). If OK go to 10.
7. Measure N700 PA power dector *DET* = 810 mV during burst (R503). Note: *DET* voltage is a function of output power.
8. Measure N700 PA control voltage a) *VPCTRL_P* = 1,0 V during burst (R716) and N700 PA bias voltage b)*VTXB_P* = 2,7 V (C532). Note: *VPCTRL_P* voltage is a function of power level
9. Measure N700 PA supply voltage *VBAT* (C724).
10. Measure RF level = -5 dBm at antenna pad *J800*.
11. Measure Z809 antenna switch control signal voltages a) *VANT_1* = 2,7 V (C804), b) *VANT_2* = 2,7 V (C806) and c) *VANT_3* = 0 V (C805).

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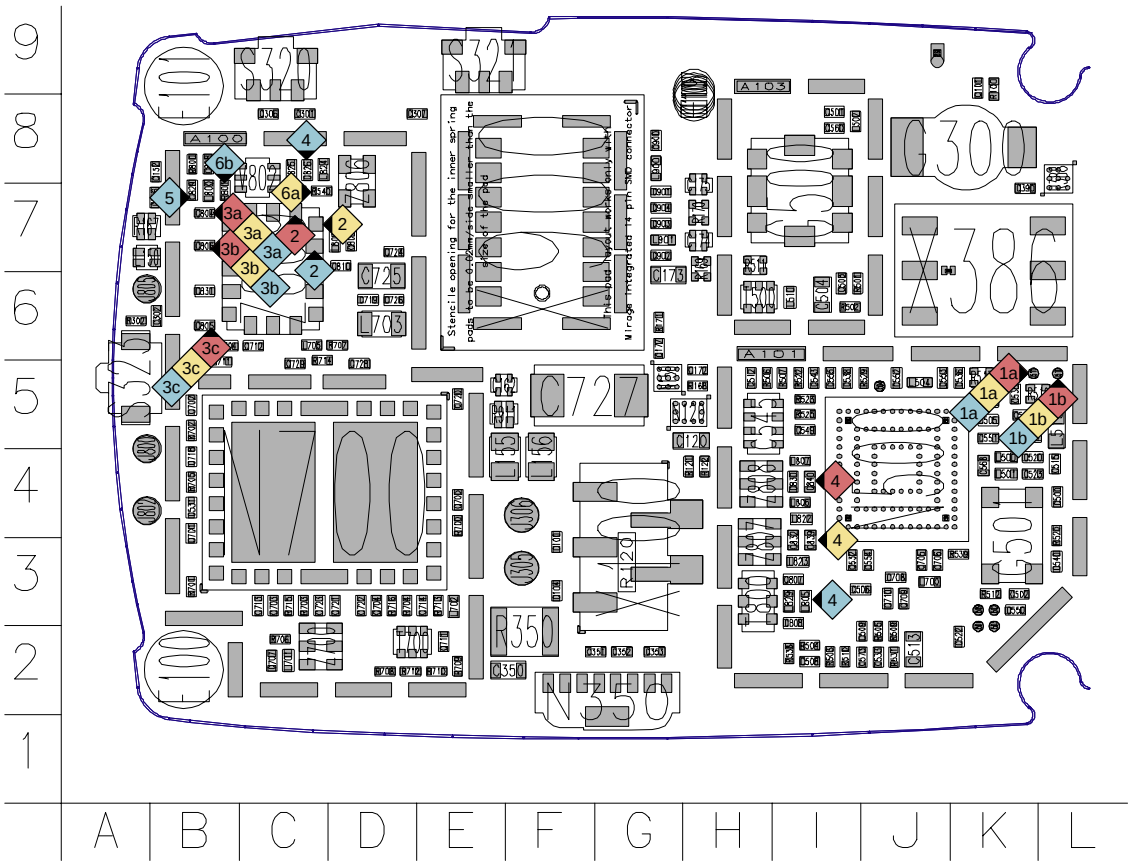
Rx Troubleshooting



Rx 850/900 troubleshooting
GSM850 ch. 190 or GSM900 ch. 37. Continuous Rx. Use AGC "gain step" 14.
Apply a signal of 942,46771 (+67,71 kHz offset) at -90 dBm to the antenna pad J800.
Spectrum analyzer: RBW = 500 kHz, VBW = 500 kHz, center = 942 MHz and span = 20 MHz.

1. Measure voltage of a) *RXI* (J511) and b) *RXQ* (J510). *RXI* and *RXQ* = 800 mVpp and 1,35 VDC. Note: DC level drop after a while. Change signal level to -30 dBm.
2. Measure RF level = -55 dBm at Z808 SAW filter input. If OK goto 4.
3. Measure Z809 antenna switch control signal voltages a) *VANT_1* = 0V (C804), b) *VANT_2* = 0V (C806) and c) *VANT_3* = 0V (C805). If not OK go to "Helga / synthesizer troubleshooting".
4. Measure RF level = -55 dBm at Helgo input (C840, both terminals). If OK go to "Helgo / synthesizer troubleshooting".

Rx1800 troubleshooting
GSM1800 ch. 700. Continuous Rx. Use AGC "gain step" 14.
Apply a signal of 1842,86771 MHz (+67,71 kHz offset) at -90 dBm to the antenna pad J800.
Spectrum analyzer: RBW = 500 kHz, VBW = 500 kHz, center = 1840 MHz and span = 20 MHz.

1. Measure voltage of a) *RXI* (J511) and b) *RXQ* (J510). *RXI* and *RXQ* = 500 mVpp and 1,35 VDC. Note: DC level drop after a while. Change signal level to -30 dBm.
2. Measure RF level = -30 dBm at Z807 SAW filter input (Z809 antenna switch pin X). If OK goto 4.
3. Measure Z809 antenna switch control signal voltages a) *VANT_1* = 0V (C804), b) *VANT_2* = 0V (C806) and c) *VANT_3* = 0V (C805). If not OK go to "Helga / synthesizer troubleshooting".
4. Measure RF level at Helgo input (C839 (not assembled), both terminals). If OK go to "Helgo / synthesizer troubleshooting".

Rx1900 troubleshooting
GSM1900 ch. 661. Continuous Rx. Use AGC "gain step" 12.
Apply a signal of 1960,06771 MHz (+67,71 kHz offset) at -90 dBm to the antenna pad J800.
Spectrum analyzer: RBW = 500 kHz, VBW = 500 kHz, f = 1960 MHz and span = 20 MHz.

1. Measure voltage of a) *RXI* (J511) and b) *RXQ* (J510). *RXI* and *RXQ* = 700 mVpp and 1,35 VDC.
Change signal level to -50 dBm and set "gain step" 6.
2. Measure RF level at Z806 SAW filter input (Z809 antenna switch pin X). If OK goto 4.
3. Measure antenna switch control signal voltages a) *VANT_1* = 0V (C804), b) *VANT_2* = 2,7V (C806) and c) *VANT_3* = 0V (C805).
4. Measure RF level at V802 LNA input (C826).
5. Measure RF level at V802 LNA output (C829).
6. Measure a) V802 LNA supply voltage *LNA_P* = 2,8V (V802 pin 4) and b) LNA control voltage *LNAB_P* = 2,8V (R801).
7. Measure RF level at N500 Helgo input (L805). If OK go to "Helgo / synthesizer troubleshooting.

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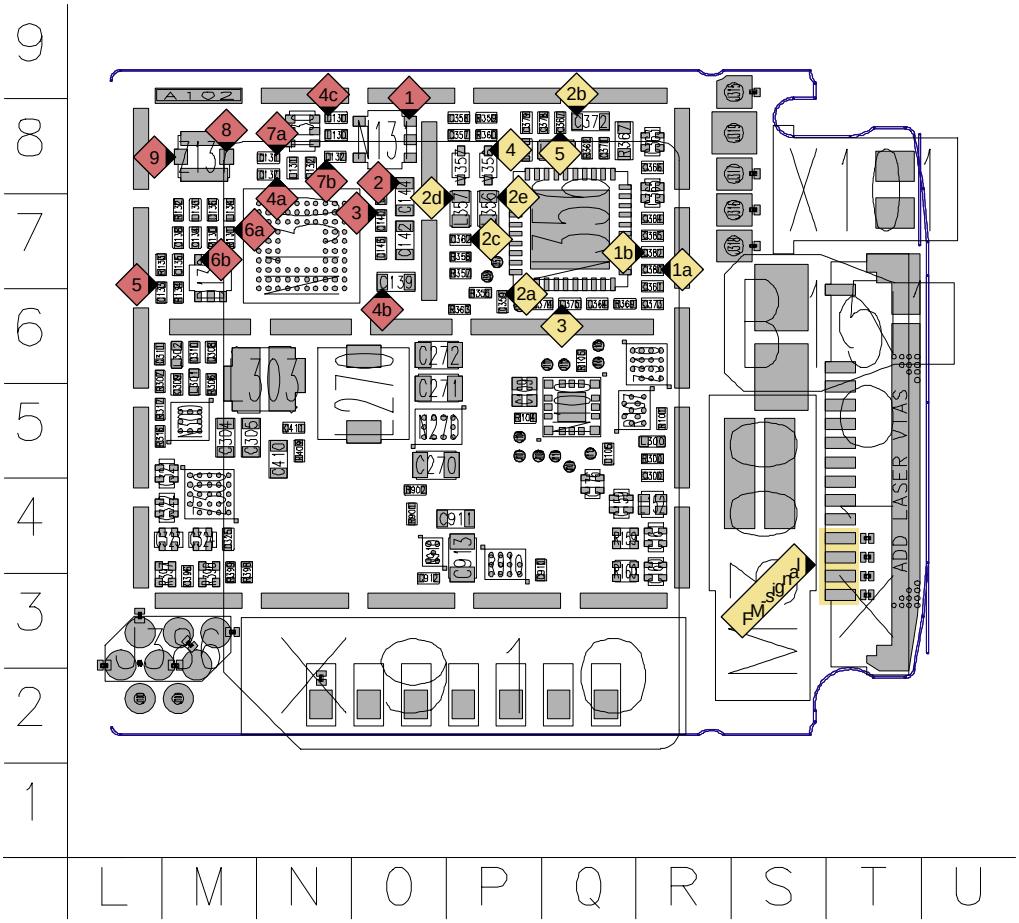
Bluetooth / FM Radio Troubleshooting



7 - System Module

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Glossary of Terms

ACI	Accessory Control Interface
ADC	Analog Digital Connector
AMSL	After Market Service Leader
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Integrated Passive
ADSP	Application DSP (expected to run high level tasks)
ARM	Advanced RISC Machines
BB	Baseband
BC02	Bluetooth module made by CSR
CCP	Compact Camera Port
CDSP	Cellular DSP (expected to run low level tasks)
COF	Chip on foil
COG	Chip On Glass
CSR	Cambridge Silicon Radio
CSTN	Color Super Twisted Nematic
CTSI	Clock Timing Sleep and Interrupt block of Tiku
DCT4.5	Digital Core Technology, generation 4.5
DSP	Digital Signal Processor
EMC	Electro Magnetic Compatibility
ESD	Electro Static Discharge
FCI	Functional Cover Interface
FR	Full Rate
FSTN	Film compensated Super Twisted Nematic
GSM	Global System Mobile
HW	Hardware
IF	Interface
IHF	Integrated Hands Free
IMEI	International Mobile Equipment Identity
IR	Infrared

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IrDa	Infrared Data Association
LCD	Liquid Crystal Display
LDO	Low Drop Out
LED	Light Emitting Diode
LPRF	Low Power Radio Frequency
MCU	Microprocessor Control Unit
NTC	Negative temperature Coefficient, temperature sensitive resistor used as an temperature sensor.
PA	Power Amplifier (RF)
PDA	Personal Digital Assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	SW tool of DCT4.x
PUP	General Purpose IO (**P**IO), **U**SARTS and **P**ulse Width Modulators
PWB	Printed Wired Board
PopPort™	BB4.x system connector. It includes: USB, Stereo headset, Fbus.
RTC	Real Time Clock, small circuitry that keeps track of updating the clock counter and the calendar. To keep it update without (or empty) battery, an alternative power source can be used: small battery or large capacitor.
SARAM	Single Access RAM
SIM	Subscriber Identification Module
SW	Software
SWIM	Subscriber / Wallet Identification Module
SPR	Standard Product Requirements
STI	Serial Trace Interface
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP (Universal Phone Processor), Official Tiku3G
UEMEK	Universal Energy Management Enhanced
UI	User Interface
USB	Universal Serial Bus
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC

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Baseband Module Introduction

This chapter describes the baseband module for the RM-72 program. The baseband module includes the baseband engine chipset, the UI components and acoustical parts of the transceiver.

The RM-72 is a hand-portable GSM900/GSM1800/GSM1900 phone for the Smart Classic segment, having the DCT4.5 generation baseband- and RF circuitry. The key driver for this product is the implementation of EDGE, introducing true multimedia capability from WCDMA in GSM single mode.

RM-72 is equipped with the DCT4 connector, supporting most of the DCT4 accessories. The battery interface consists of only 3 connections. Standard battery is the BL-5C battery with 900 mAh.

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Technical Specifications

UEMEK

UEMEK is the Universal Energy Management Enhanced IC for digital hand portable phones. In addition to energy management, the UEMEK functionality performs all baseband mixed–signal functions.

The different states of the UEMEK are explained below.

No supply

In the NO_SUPPLY mode the UEMEK has no supply voltage (VBAT < VMSTR and VBACK<V_BUCOFF-). This mode is due to the fact, that both the main battery and the backup battery are either disconnected or both discharged to a low voltage level.

The UEMEK will recover from NO_SUPPLY into the RESET mode, if the VBAT voltage level rises above the VMSTR+ level, by either reconnecting the main battery or charging it to such level.

Backup

In the BACK_UP mode the main battery is either disconnected or has a low voltage level (VBAT < VMSTR- and VBACK > V_BUCOFF+).

The regulator VRTC that supplies the real time clock is disabled in the BACK_UP mode. Instead the unregulated backup battery voltage VBACK supplies the output of the VRTC. All other regulators are disabled and the phone has no functionality.

The UEMEK will recover from the BACK_UP mode into the RESET mode if VBAT rises above VMSTR+.

Power off

In order for the UEMEK to be in the PWR_OFF mode, it must have supply voltage (VBAT > VMSTR+).

The VRTC regulator is enabled and supplying the RTC within the UEMEK. The UEMEK will enter the RESET mode after a 20 ms delay whenever one of the below listed conditions is logically true:

- The power button is activated.
- Charger connection is detected.
- RTC alarm is detected.

The UEME will enter PWR_OFF from all other modes except NO_SUPPLY and BACK_UP if the internal watchdog elapses.

Reset

When the UEMEK enters the RESET mode from the PWR_OFF mode the watchdog is enabled. If the VBAT fails to rise above the power-up voltage level VCOFF+ (3.1 V), before the watchdog elapses, the UEMEK will enter the PWR_OFF mode. Otherwise, after a 200 ms delay the regulator VFLASH1 will be enabled and after an additional delay of 500 _s, the regulators VANA, VIO, VCORE and VR3 will be enabled. All other regulators i.e. VFLASH2, VSIM,

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VR1, VR2 and VR4 – VR7 are software controlled and disabled by default. After an additional delay of 20 ms, the UEMEK enters the PWR_ON mode.

Power on

In PWR_ON the UEMEK is fully functional in the sense that all internal circuits are powered up or can be by means of software. The UEMEK will enter the PWR_OFF mode if VBAT drops below VCOOF- for a period of time longer than 5 _s. The UEMEK will furthermore enter the PWR_OFF mode if either of the watchdogs Operational State Machine (approx. 100 _s), Security (32 sec.) or Power Key (4 sec.) elapses or if any of the regulators triggers the thermal protection circuitry.

Sleep

The UEMEK can be forced into the SLEEP mode by the Tiku by setting the input SLEEPX low for more than 60 _s. This state is entered when the external Tiku activity is low (phone in sleep) and thereby lowering the internal current consumption of the UEME. The regulator VANA is disabled and VR1 – VR7 are either disabled or in low quiescent mode. From SLEEP the UEMEK enters PWR_ON if SLEEPX goes high, the PWR_OFF mode if watchdog elapses or the BACK_UP mode if VBAT drops below VMSTR-.

Protection mode

The UEMEK has two separate protection limits for over temperature conditions, one for the charging switch and one for the regulators. The temperature circuitry measures the onchip temperature. In case of charging over temperature, the circuit turns the charging switch off. In case of over temperature in any of the regulators, the UEMEK powers off.

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DC characteristics

The figures in the following table reflect the specification of the voltage and current regulators within the UEMEK.

Table 1: UEME Regulator Output and State in Sleep

Name	Voltage (V)			Current (mA)		Filter	Comment
	Min	Nom	Max	Max	Sleep Max		
VANA	2.70	2.78	2.86	80		2	5uA minimum for stability. Controlled by the UEME. Disabled in Sleep mode.
VFLASH1	2.61	2.78	2.95	70	1.5	1	5uA minimum for stability. Controlled by the UEME.
VIO	1.72	1.80	1.88	150	0.5	3	5uA minimum for stability. Controlled by the UEME.
VCORE	1.49 1.71	1.57 1.80	1.65 1.84	200	0.2	1	5uA minimum for stability. MCUSW is setting the voltage.
VAUX1	1.745 2.91	1.80 3.0	1.855 3.09	50	0.5	1	Voltage level is set by MCUSW.
VAUX2	2.70	2.78	2.86	70	0.5	1	5uA minimum for stability.
VAUX3	2.70	2.78	2.86	10	0.5	1	5uA minimum for stability.
VSIM	1.745 2.91	1.80 3.00	1.855 3.09	25	0.5	-	5uA minimum for stability.
VR1A/B	4.60	4.75	4.90	10	-	4	Disabled in Sleep mode. The maximum current is for 1 regulator active. If both are used, maximum 5mA each.
VR2	2.70 (2.61)	2.78 (2.78)	2.86 (2.95)	100	-	5	100uA minimum for stability. Active during (Sleepmode).
VR3	2.70	2.78	2.86	20	-	4	100uA minimum for stability. Controlled by the UEME.
VR4	2.70	2.78	2.86	50	0.1	6	100uA minimum for stability.
VR5	2.70	2.78	2.86	50	0.1	7	100uA minimum for stability.
VR6	2.70	2.78	2.86	50	0.1	7	100uA minimum for stability.
VR7	2.70	2.78	2.86	45	-	7	100uA minimum for stability.

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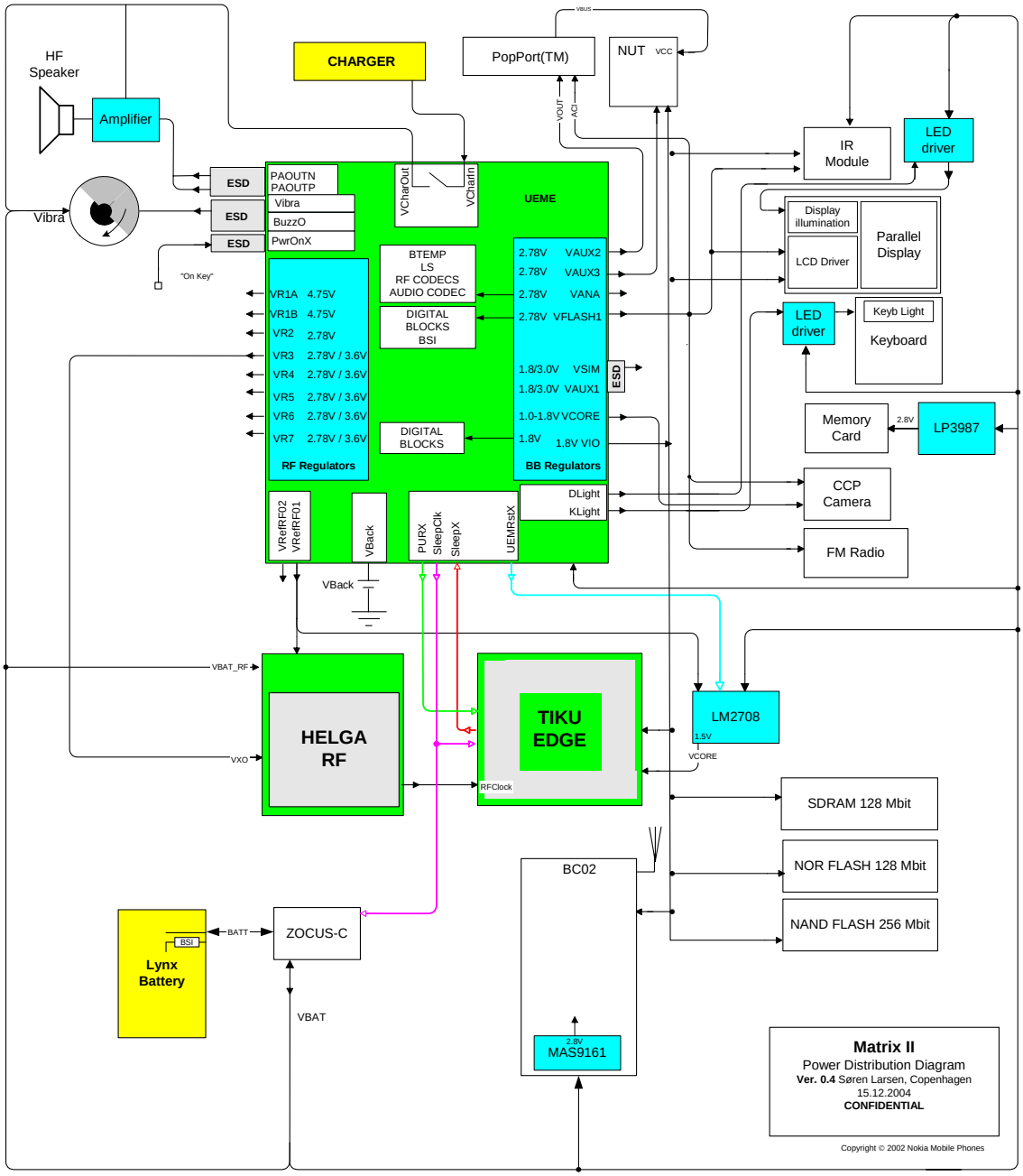
Power Distribution

The connection of the miscellaneous power connection can be seen in the following overview.

Figure 1: Power distribution



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Tiku

This is the main digital baseband ASIC.

Main features

The Tiku consists of the following sections:

- Arm 925 MPU
- A-DSP (Lead3 for Application sw – 4KB ApiRam, 128KB saram, 32KB daram)
- C-DSP (Lead3 for Cellular sw – 4KB ApiRam, 128KB saram, 32KB daram)
- DSP Co-processors (DCT and Motion Estimator) on both DSP
- Corona EDGE hardware accelerator
- Serial flash interface (SFI001)
- 2G Body logic, as in UPP-WD2
- 4Mb of pdram.
- Traffic controller for memory interface (dct4 flash/sram, sdram)
- General purpose USARTs
- SIM card interface
- 2^{nd} SIM interface (used for MMC)
- I^2C interface (used for FCI)
- GSM coder
- Interface control for: keyboard, LCD, Camera, audio and UEMEKUEMEK control
- Accessory interfaces: IrDa and LPRF (Bluetooth)
- Handling of RF-BB interface
- I/O voltage = 1.8V, Core voltage = 1.5V
- TI 15C035 process (Tiku version 1.11)
- 288 pins uBGA, 0.5mm pitch, 12 mm x 12 mm package (Tiku version 1.11)

The brain consists of 5 sections; the ARM925 Mega-Module, (consisting of the ARM9 MCU, Cache memory, Parallel LCD Controller, and Traffic Controller), C-DSP Lead 3 Mega-Module, A-DSP Lead 3 Mega-Module, PDRAM, and PDA Peripherals.

The ARM-Mega-Module has a Traffic controller, which provides the interface between the MCU, external memories, LCD controller, and internal busses. It also processes the data packages for memory access.

The PDA Peripherals consists of Camera Compact Port (CCP) interface, Multi-Media Card (MMC), IR, USB, and Display interfaces.

Memory block

For the MCU, TIKU includes ROM, 2 kbytes, that is used mainly for boot code of MCU. For the program memory, 4Mbit (256K x 16bit, organized as 8 banks of 64Kb) PDRAM is integrated. RAM is mainly for MCU purposes. The MCU can also store a code into the external flash memory, which consist of one NOR flash and one NAND flash. The size of the NOR flash is 128Mbit

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(8Mbit x16bit) and it's used for primary application code. The secondary flash is a NAND flash, which is used for slow accessible data such as user-settings, pictures, ringtones etc. (non speed dependent code). The size of the NAND flash is 64Mbit (4096K x 16 bit).

Memory

The external memory interface consists of three different type of memory, used for different purposes.

NOR Flash

The NOR flash is used as the primary data storage. Here the MCU sw package is stored.

Furthermore, the memory is capable of handling burst mode (multiplexed address/data-bus) and memory blocking, which is controlled by TIKU.

NAND Flash

The NAND flash is used as the secondary data storage, mainly used for user specific data like sounds, games, pictures and other applications. This device also stores language package.

SDRAM

The SDRAM is used as a data handling memory.

The SDRAM interface to TIKU is different than the 24 lines multiplexed data/address bus used for the flash memory. First the address is set up then the data is latched out in a normal asynchronous/synchronous way. In the synchronous mode, the data is clocked out at a maximum frequency at 133MHz.

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Charging

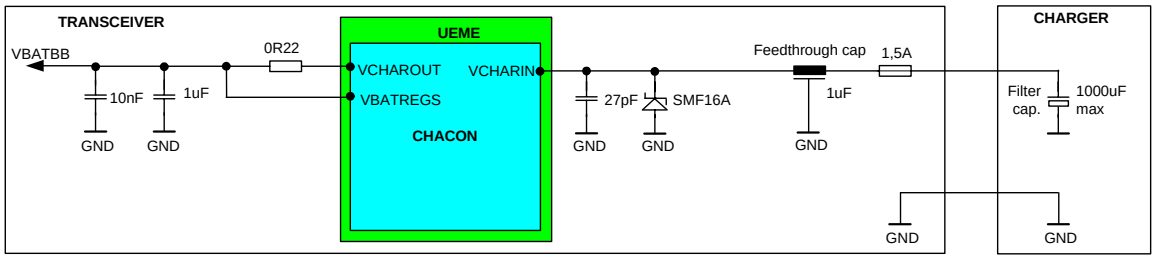
The RM-72 program is conform to the global NMP Charger Interface.

This comprehensive interface ensures future proofing should new chargers become available.

Charging is controlled by the UEMEK and external components are needed for EMC, reverse polarity and transient protection of the input to the baseband module. The charger connection is through the system connector interface. The DCT4.5 baseband is designed to support DCT3 chargers from an electrical point of view. Both 2- and 3-wire type chargers are supported. 3-wire chargers are treated as 2-wire (PopPort™ specifications).

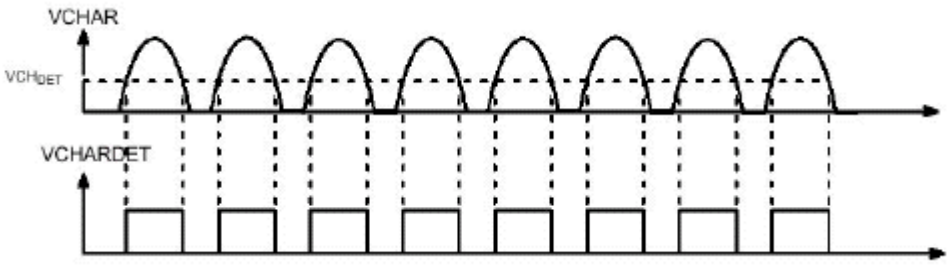
The operation of the charging circuit has been specified in such a way as to limit the power dissipation across the charge switch and to ensure safe operation in all modes.

Figure 2:Charging



Connecting a charger creates voltage on VCHAR input. When VCHAR input's voltage level is detected to rise above the VCHDET+ threshold by CHACON, the charging starts. The VCHARDET signal is generated to indicate the presence of the charger. However, detection output signal must be gated always to a logical '0' when MSTRX='0', in order not to force logical high level to the UEMEK's internal blocks that are not supplied at the time. Level crossing detection of the VCHAR line is used to generate synchronizing pulses for UEMEK's state machine for control of rectifier type chargers. The VCHARDET output gives a logical '1' when the VCHAR input is detected to be above the VCHDET+ level and '0' when the VCHAR input level is below VCHDET.

Figure 3:Detection of charger / generation of charger synchronisation pulses



In case the main battery is fully discharged and the UEMEK subsequently is without power, i.e. in NO_SUPPLY or BACKUP mode, the start-up charging circuitry is in control, giving the possibility to detect a charger and engage charging. If the VBAT level is detected to be lower than the master reset voltage (VMSTR-) the CHACON will charge the battery with a constant current of 100 mA until VBAT exceeds VMSTR+. When this happens, from a charging point of view,

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normal PWM charging situation resumes. A PWM signal is generated by the digital part of the UEMEK, which sources the CHACON. The frequency of the signal can be either 1 Hz or 32 Hz. If the connected charger is of a 2-wire kind, e.g. ACP- 7, the PWM signal has the frequency of 1 Hz. If the charger on the other hand is a 3-wire type, e.g. ACP-9, the switch is left on permanently and the 32 Hz PWM control signal routed to the charger in order to produce a constant voltage.

Battery

Type: BL-5C

Technology: Li-Ion. 4.2V charging. 3.1V cut-off

Capacity: 900 mA/h (BSI=75K)

The battery is a Li Ion based standard cell with LiMnO chemistry.

Figure 4: BL-5C Battery

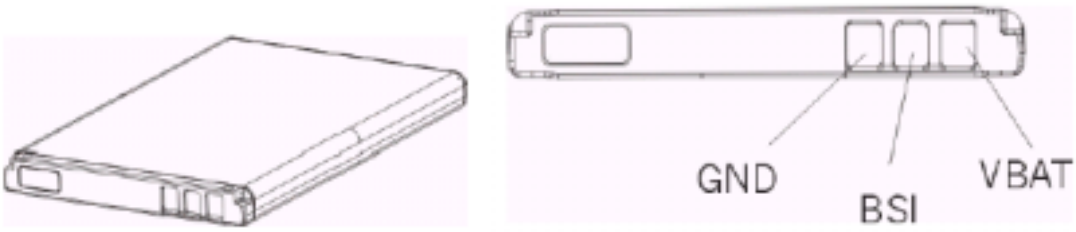

Table 2: BSI Levels BL-5C Battery

Mode	BSI (kOhm /			Description
	Min	Type	Max	
Normal		75		Used for calculating the Capacity (BL5-C = 850mA)
Service	3.2	3.3	3.4	Pull-down resistor in battery. Used for fast power-up in production (LOCAL mode), R/D purposes or in aftersales, 1% tolerance resistors shall be used.
Test	6.7	6.8	6.9	Pull-down resistor in battery, used in production for testing purposes. 1% tolerance resistors shall be used.
Banned			<3.2	

Inside the battery, an over-temperature and an over-voltage protection circuit are implemented.

Care should be taken with the temperature. If the battery is charged above 60 degrees Celsius, overheating might occur.

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Interfaces

FM-Radio

The FM radio circuitry is implemented using a highly integrated radio IC, TEA5767HN. The MCU SW controls the FM radio circuitry through serial bus interface.

The stereo output is fed to the UEMEK on one of the microphone inputs.

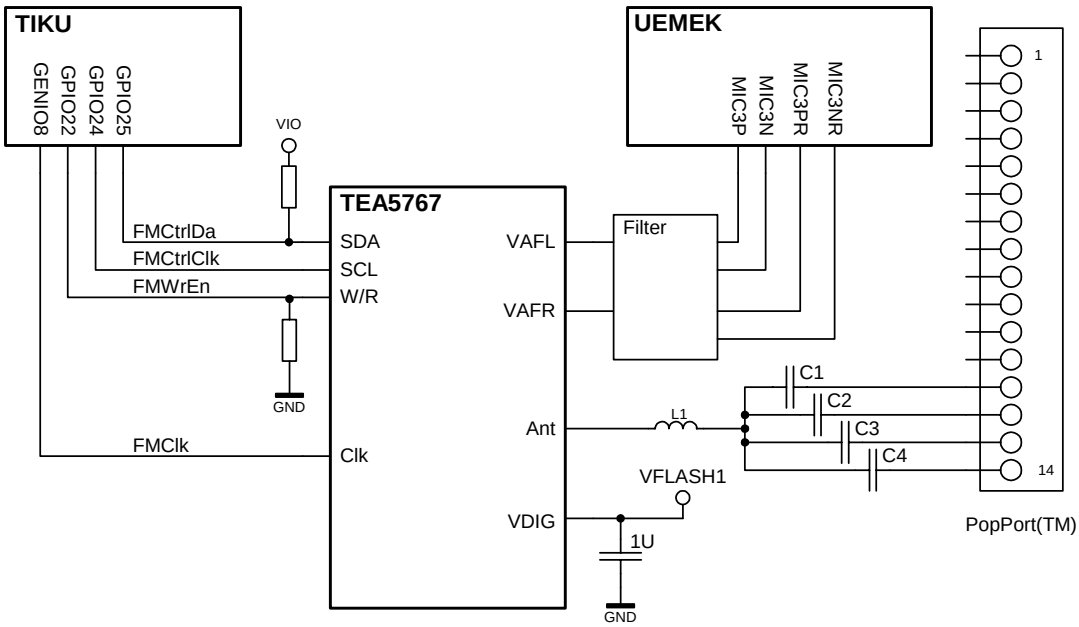
The antenna of the FM Radio is created with the headset. The wires of the headset are used as poles of the antenna.

Only version TEA5767HN-VF1 and newer can be used.

A tuning function recognises when the field strength is high or when a band limit is reached.

Interface to engine

Figure 5:FM Radio schematic



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IrDA

The RM-72 phone supports data connectivity via the Infra Red link. The IR interface is integrated into the TIKU and the main external component is the IR module. The datarate supported will be 1.152Mbit.

Interface to engine

This interface receives data from and transmits data to peripheral equipment. It transforms serial data to parallel data for the MCU or DSP and vice versa. The IAccIF IR interface is divided into two blocks, MIR and FIR. IR is a UART-based block for baud rates in the range 9600 bit/s to 115.2 kbit/s, and FIR is for the 1.152 Mbit/s rate. Both parts have the same physical connections so they cannot be used simultaneously. The shut down pin SD can power off the module.

The maximum distance in the RM-72 phone configuration is approximately 20 cm.

Figure 6:IRDA Interconnections between Tiku and UEMEK

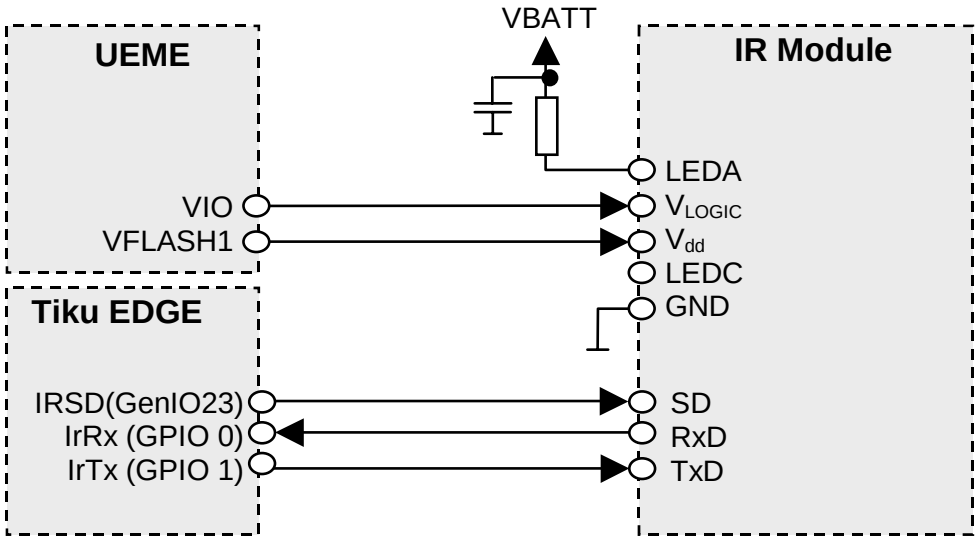

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Table 3: IRDA connections between Tiku EDGE and the IR module

Name	I/O	Engine connection		Description
TXD	O	TIKU	GPIO1: [IRTx]	Transmitted data output to IR Module
RXD	I	TIKU	GPIO0: [IRRx]	Received data input from IR Module.
SD	O	TIKU	GenIO23: [IRSD]	IR Module shut down.
VLOGIC	O	UEMEK	VIO	Supply voltage for digital parts, 1.8 V.
VCC	O	UEMEK	VFLASH1	IR Module supply voltage, 2.78 V.
LEDA	O	VBATT		IR LED Anode supply voltage.

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Camera

This phone is equipped with a 1.3 Mpixel (SXGA) resolution camera. Pictures delivered to the engine are standard SXGA (1280x1024). The camera is able to transfer up to 15 frames per second in the viewfinder mode and 15 frames per second in full resolution mode (SXGA). Full resolution pictures are in RGB 5:6:5 or YUV 4:2:2 (10 bits raw sensor resolution).

Two different versions of the camera are used in RM-72. They can be recognised by the type of PWB material used on the backside of the camera.

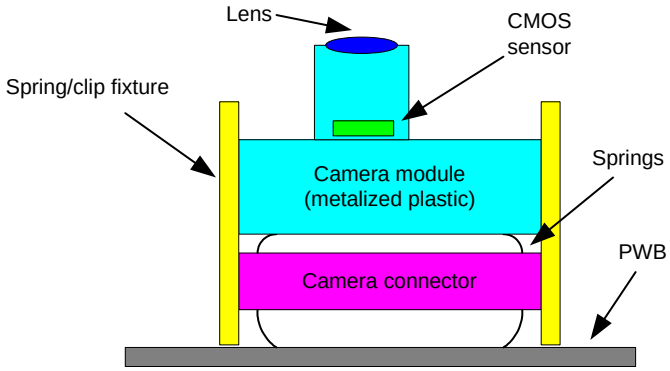
- LZOP3932 (NMP code 4858047), Ceramic (brown)
- TCM8120MD (NMP code 4858061), F4R (green)

Mounting

The camera is placed physically almost inside the antenna on the backside of the phone PWB. The camera fixture (spring type, see the figure below) is located between the RF shielding cans. Shielding is done in a combination of metalized plastic housing of the camera module and ground connected spring/clip fixture.

Experience shows that good shielding is necessary. The metalized housing and the spring/clip will shield the camera. The hole for the lens is kept as small as possible to avoid direct EMC entrance into camera module by lens opening.

Figure 7:Camera Module Mounting



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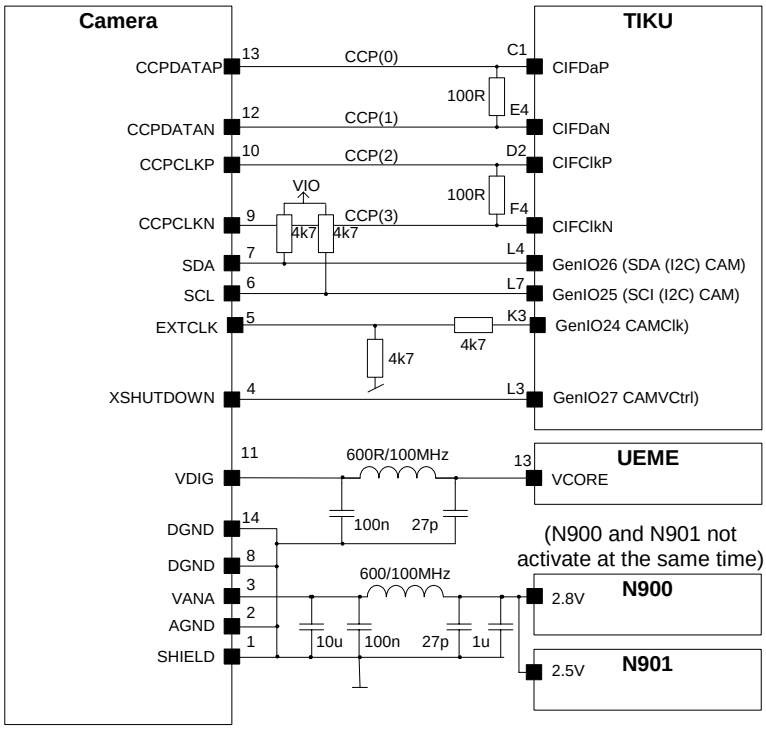
Interface to engine

The camera is connected to the TIKU via a dedicated differential camera bus called CCP. The control of the camera is routed through normal-type general I/O ports. The camera uses 2 different supplies; analog and digital supply.

Figure 8:Camera Interface



Power supply to the camera module must be shut down when the camera is in idle mode. The camera uses very low stand-by current (1 mA in current specification). Depending on the camera version, the camera needs different supply voltages. This is automatically detected and set by the phone camera driver SW.

Table 4: Camera supply voltage

Camera	Vdig	Vana
LFOP3932	1.57 V (Vcore_lin)	2.5 V (N901)
TCM8120MD	1.8 V (Vcore_lin)	2.8 V (N900)

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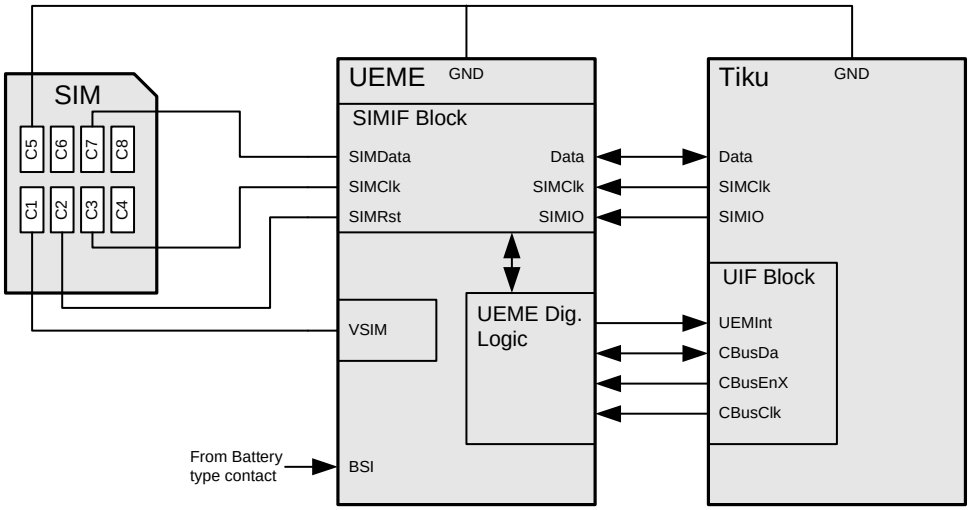
SIM

The UEMEK contains the SIM interface logic level shifting. The SIM interface can be programmed to support 3V and 1.8V SIMs.

The SIM interface is powered up when the SIMCardDet signal indicates, ”card in”. This signal is derived from the BSI signal.

Interface to engine

Figure 9:TIKU/UEMEK SIM Interface Connections



The internal clock frequency from the CTSI Block is 13 MHz in GSM.

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Figure 10:SIM Interface Data

Characteristics	Condition	Min	Typ	Max	Unit
SIMPwr, Vcc	on	1.6	1.8	2.0	V
		2.8	3.0	3.2	V
MoneyPwr (5 V), Icc	5 MHz	10			mA
SimPwr(3 V),Icc	4 MHz	6			mA
MoneyPwr(5V), Spikes on Icc (max duration 400 ns)	on			100	mA
SimPwr(3V), Spikes on Icc (max duration 400 ns)	on			50	mA
SimData, MoneyData, SimClk,MoneyClk,SimRst,MoneyRst, V_{OH}		0.9 x Vcc		Vcc	V
SimData, MoneyData,V_{IH}	(External pull–up resistor 20k to Vcc)	0.7 x Vcc		Vcc	V
SimData, MoneyData,V_{IL}		0		0.15 x Vcc	V
SimData, MoneyData,V_{OL}	I_{IL} = 1 mA ***	0		0.15 x Vcc	V
SimData, MoneyData,I_{IH}	V_{IH}	20			µΩ
SimData, MoneyData,I_{OH}	V_{OH}	20			µΩ
SimData, MoneyData,I_{OL}	V_{OL}	20			µΩ
SimData,MoneyData, t_R/t_F	C_{IN} = 30 pF; C_{OUT} = 30 pF			1	µs
SimRst,MoneyRst	C_{OUT} = 30 pF			1	µs
SIMCLK frequency		1.05		3.36	MHz
SimClk,MoneyClk,t_R/t_F	C_{OUT}= 30 pF			26	ns
SimClk, MoneyClk,I_{OH}	V_{OH}	100			µΩ
SimClk, MoneyClk,I_{OL}	V_{OL}	20			µΩ
SimRst, MoneyRst,I_{OL}	V_{OL}	20			µΩ
SimRst, MoneyRst,I_{OH}	V_{OH}	150			µΩ
The voltage on Clock, Data and Rst shall remain between –0.3V and Vcc + 0.3 V .					

MMC

The RM-72 phone is equipped with a standard MMC card (multimedia card) connector. The MMC card is physically placed under the battery, on top of the BB shielding can. The card can be replaced when the phone is powered off, and the b-cover and battery are removed. The RM-72 phone is able to accept all known high and dual voltage types of MMC cards. The only limitation is a maximum current withdrawal of 150 mA, where the maximum current class of MMC cards is 200mA. MMC cards up to 512 Mb are supported.

Table 5: VMMC power specifications

Name	Voltage (V)			Current (mA)	Filter	Comment
	Min	Nom	Max	Max		
VMMC	2.76	2.85	2.94	150	1	

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Mounting

The MMC card is mounted as shown in the figure below, seen from the backside of the phone, with the b-cover and battery removed. The MMC card slides in from the right side.

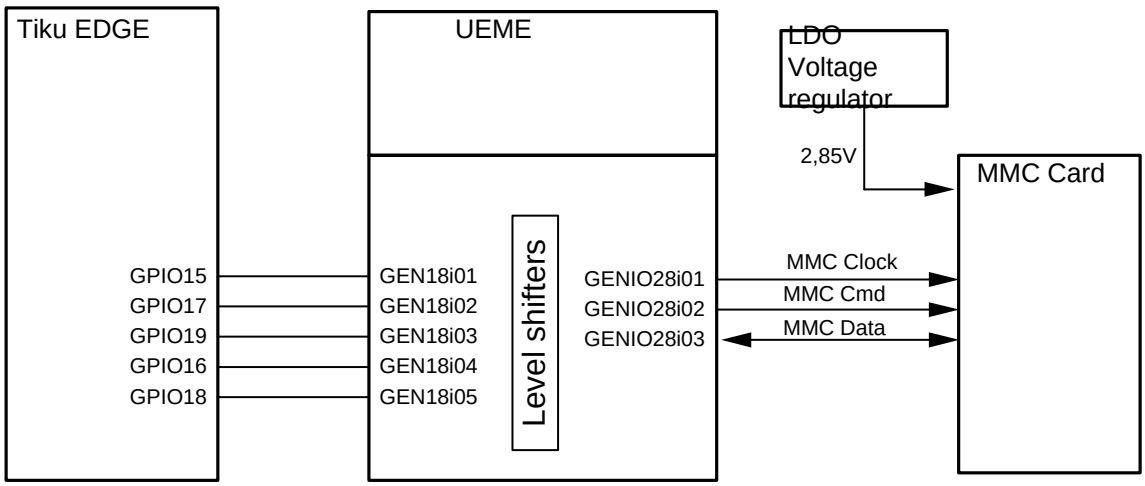
Figure 11:MMC Card Placement

Interface to engine

The MMC card is connected to the engine at UEMEK. MMC uses the dedicated MMC/secondary SIM (SWIM) card interface.

As it can be seen in the figure below**, the MMC card uses an external regulator VMMC as supply.**

Figure 12:MMC Card Engine Interface



Bluetooth

The Bluetooth solution for the RM-72 phone is a single chip solution designed by CSR.

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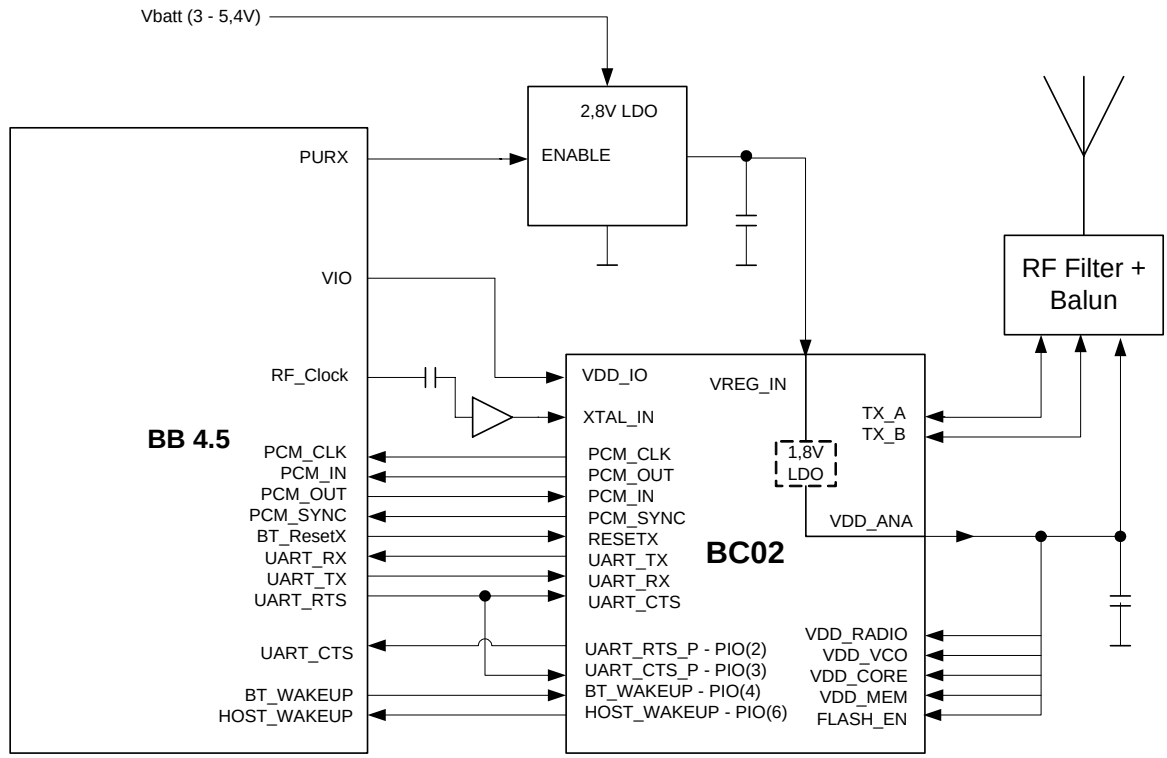
Interface to engine

Figure 13:BT HW Interface



Power management

The external BT regulator is enabled by PURX, witch is an internal UEMEK reset signal. This signal is high whenever the phone is powered on, which also is the case in sleep.

This means that the BC02 module power is always on. Due to this, the modules use sw power down, witch results in a constant current consumption of approx. 100µA, when the BC02 module is in sleep.

Sw interface

Host and Bluetooth module interface can be logically divided into audio, user data and control interfaces.

User audio at 8 ksamples/s is exchanged between the host and the Bluetooth module on a PCM connection. (Optionally, the audio data can be multiplexed on a logical UART channel).

Accessorey interface (ACI)

ACI (Accessory Control Interface) is a point-to-point, Master-Slave, bi-directional serial bus. ACI supports the following features:

- The identification of accessory type is provided
- The insertion and removal detection of an accessory device
- Providing power to the accessory: 200mW Power out
- Reference voltage to the accessory

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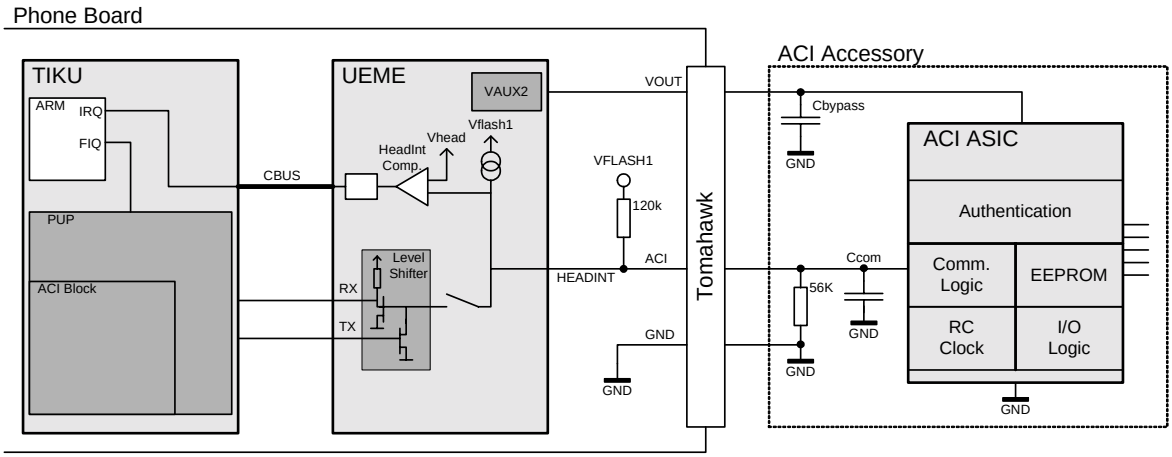
The insertion / removal detection is provided by the HeadInt input.

Figure 14:ACI schematics



The Vout pin on the PopPort^{TM} provides external power to accessories. The Vout is supplied by VAUX2 and can be controlled by the UEMEK. VAUX2 is short circuit protected.

Table 6: Vout specifications

Name	Voltage (V)			Current (mA)		Filter	Comment
	Min	Nom	Max	Max	Sleep Max		
VAUX2	2.70	2.78	2.86	70	0.5	1	

FBUS

More intelligent accessories can use the serial FBUS connection.

These devices can use Vout as the power supply and ACI for identification.

FBUS is an asynchronous data bus having separate TX and RX signals. Default bit rate of the bus is 115.2 Kbit/s. FBUS is mainly used for controlling the phone in the production and for interface to PC via serial cables. Tiku can also support fast bus. This is FBUS with a bitrate of 1.2Mbit.

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Fbus is using the same pins as the USB connection.

Table 7: Fbus signals

Name	Name	Voltage (V)			Comment
		Min	Nom	Max	
FBUS RX	VIH	1.95	2.78	3.00	0.7*VFLASH1
	VIL	0	0.20	0.83	0.3*VFLASH1
FBUS TX	VOH	1.95	2.78	3.00	0.7*VFLASH1
	VOL	0	0.20	0.83	0.3*VFLASH1
Rise Time				12.5ns	For Rx and Tx signals

USB

The Nokia USB device solution is supported using the Wireless 2 Function Controller (W2FC) core. This core is included in the TIKU ASIC. The core completes several USB functions automatically and is controlled by the ARM9 MCU.

NUT provides the interface between the ASIC's 1.8 V bus and the 3.3 V USB bus. In addition, NUT is capable of transmitting and receiving Fbus signals to and from the Fbus UART in Tiku.

Nokia USB Transceiver (NUT) is fully compliant with the Universal Serial Bus Specification Rev. 2.0.

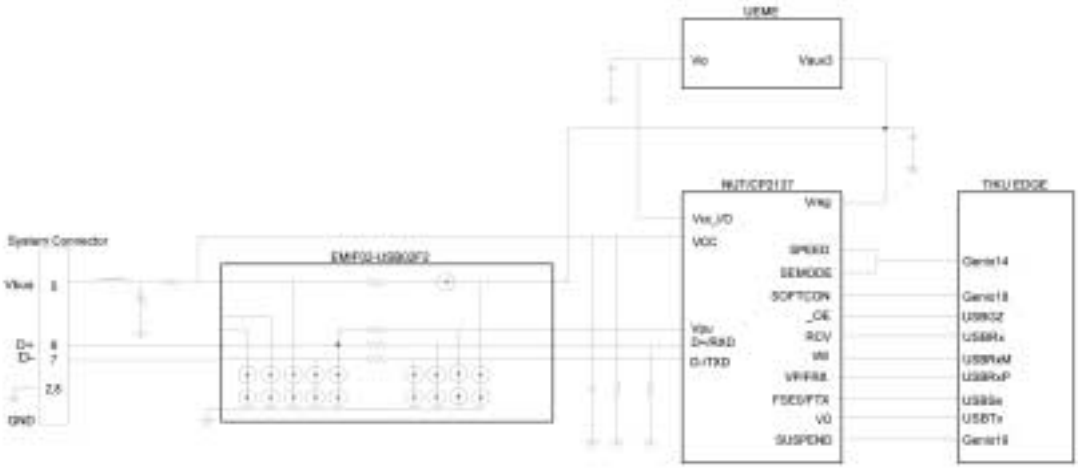
NUT is able to transmit and receive serial data at full-speed (12 Mbit/s).

The USB signal ESD protection and line matching resistance, and USB pull-up resistor is included to the USB ASIP. This component also includes ESD protection for VOUT and ACI system connector pins.

An additional USB Vbus supply protection limits the current going into NUT, by adding a series resistor between the PopPort(TM) connector pin and the input of the ASIP.

The rest of the circuitry around NUT will remain the same for this solution. To protect the resistor from ESD strikes, a varistor is placed the connector pin and the resistor.

Figure 15:USB Circuit



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UI interface

Display unit

Hardware interface:

The display unit interface is a parallel interface consisting of the following:

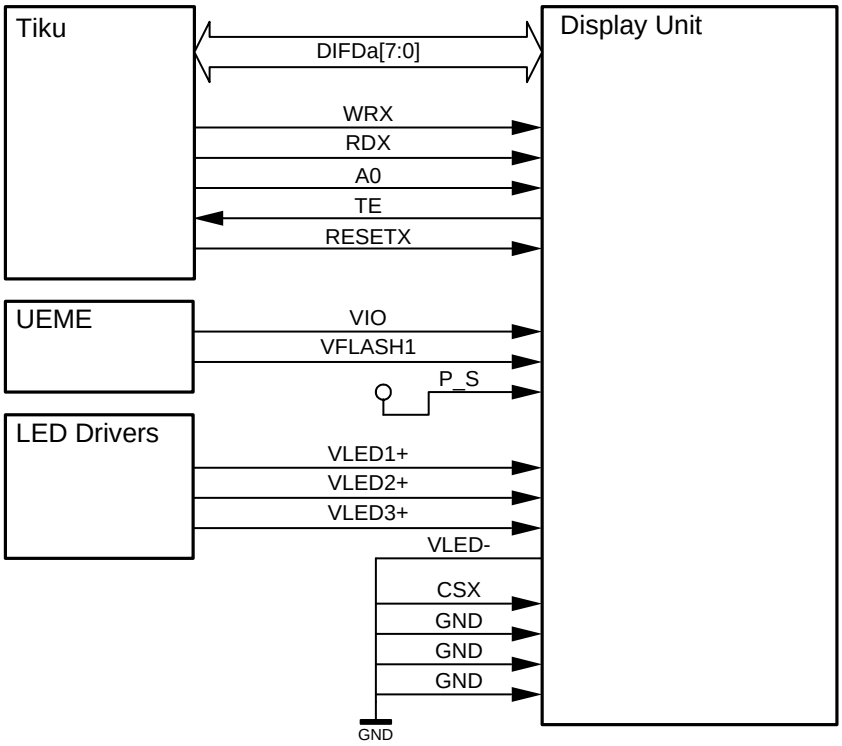
- 8-bit data bus (DISPDATA(7:0))
- Write enable WRX
- Read enable RDX

A 24-pin connector as shown in the figure below provides the interface between the Display Unit and the Engine PWB.

Internally, the TIKU DIF block has interfaces with the VIA bus and the secondary DMA controller.

Interconnection details are shown in the figure below.

Figure 16:Display Unit Connections



Keyboard and navigator

The RM-72 phone consists of a mainboard with interface to the UI board. The connection between the main board and the UI board is via a board-to-board connector.

The signals on the board-to-board connector are:

- Signals for LED's
- Signals for numeric Keypad and navigation key

The UI board is the base for the keyboard, which includes a five-way navigation key.

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Figure 17:Keyboard layout with special keys for Navi_Up, Navi_Down and Navi_Select

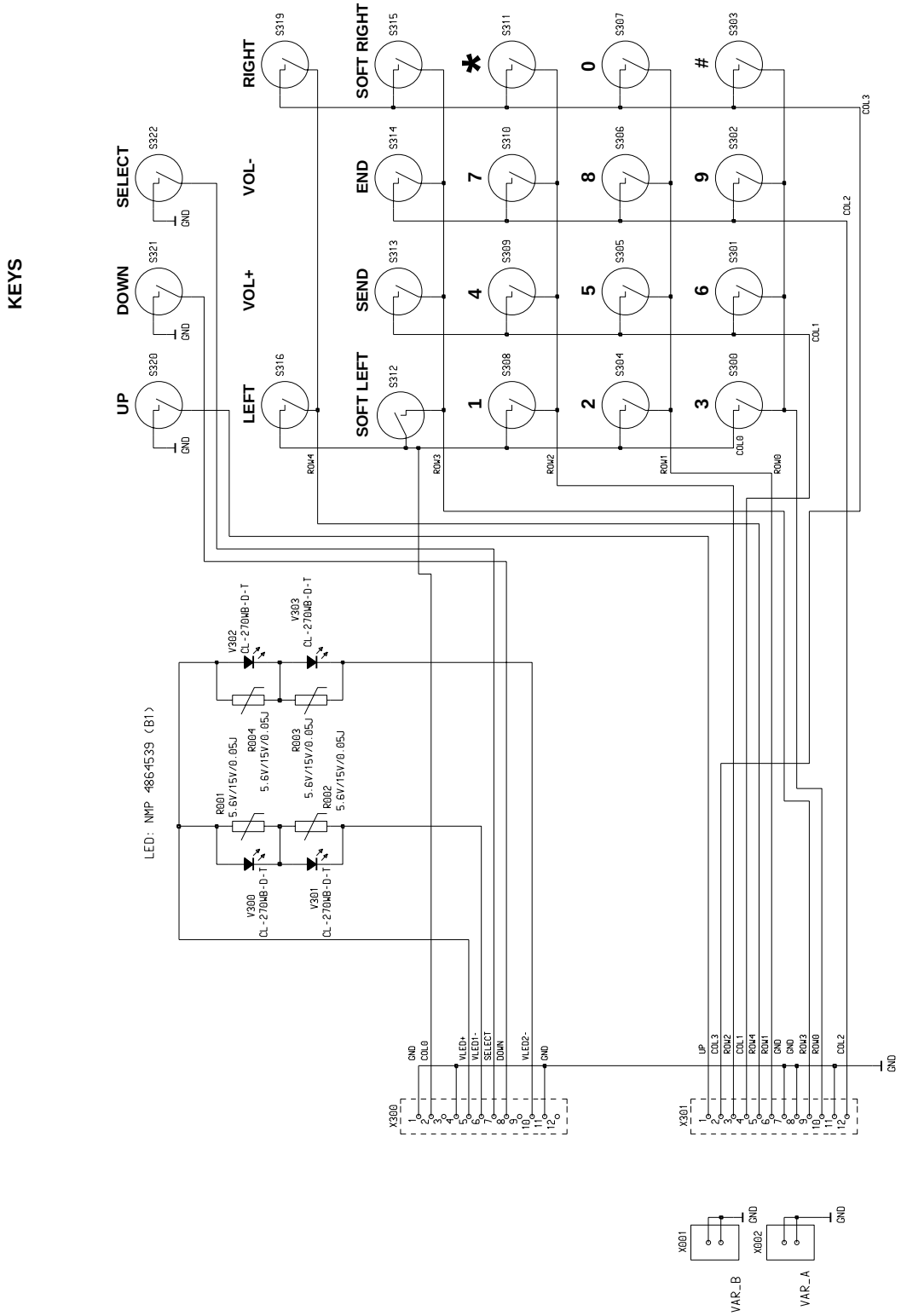

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Table 8: Keyboard allocation Tiku GPIO

Keypad matrix and Navigation key		Tiku connection		Description
Navigation Key	Left	Tiku	-	Separate controllines (Special keys) for Navi_Up, Navi_Down and Navi_Select. Navi_Left and Navi_Right are connected to the key-board matrix
	Up		GPIO 6	
	Right		-	
	Down		GPIO 7	
	Select		GPIO 13	
	GND		-	
Keypad	Column 0	Tiku	GPIO 2	Tiku, Keyboard interface KDI in the UIF block,
	Column 1		GPIO 3	
	Column 2		GPIO 4	
	Column 3		GPIO 5	
	Row 0		GPIO 8	
	Row 1		GPIO 9	
	Row 2		GPIO 10	
	Row 3		GPIO 11	
	Row 4		GPIO 12	

Multiple-keypress:

The RM-72 phone will implement multiple keypress. By multiple keypress we mean the ability to detect that the user has pressed several keys simultaneously. The incitement for implementing this functionality is mainly the support for Java and the requirements set by games.

UI software is capable of supporting multiple keypress, while core SW will have to incorporate this feature into the keyboard driver.

With the current implementation, the design supports 2 simultaneously arbitrarily pressed keys in the keyboard matrix, together with any combination of Navi_Up, Navi_Select and Navi_Down (The special keys).

LED driver

The RM-72 phone UI module has 2 sets of LED's:

- 4 pcs. for LCD – LED: White
- 4 pcs. for Keyboard – LED: White, sidefiring

Both groups are controllable by the PWM output signal from UEMEK ASICs

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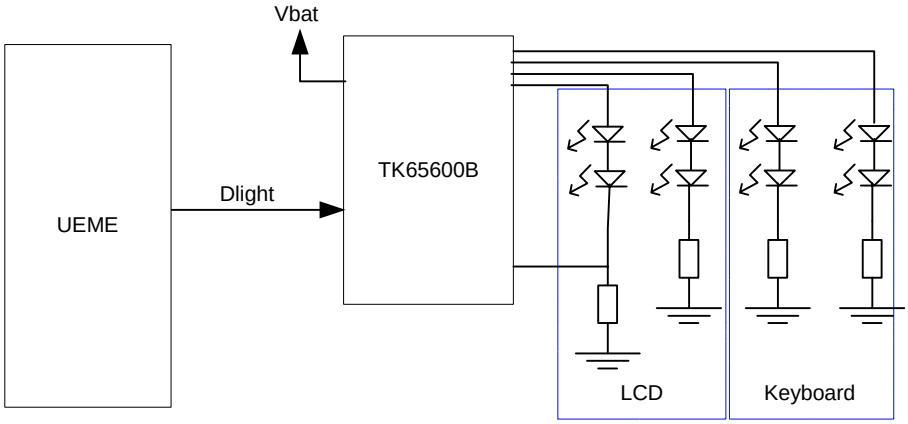
Figure 18:. LED driver block



Intensity control:

LEDs are controlled by the PWM output from UEMEK UI block. The PWM controls can be adjusted in 8-bit step (256). The TK656008 contains a sleep mode. This mode is achieved when the Dlight signal is low.

Vibra

A vibra-alerting device is used to generate a vibration signal for an incoming call. The vibra is placed in the top of the phone. It is placed in the D-cover next to the microphone.

The vibra is electrically connected to the PWB by spring contacts.

The vibra is controlled from the UEMEK by a PWM (Pulse Wide Modulated) square wave signal.

IHF-speaker

Alerting tones and/or melodies are generated by an Internal HandsFree speaker, which is controlled by a PWM signal from the UEMEK.

The ringer melodies will be optimised in MCU so the main frequency of any given melody is shifted to near the resonant peak. Sound hole is placed in the D-cover The IHF is electrically connected to the PWB by spring contacts.

The IHF speaker is driven from a separate power amplifier (Boomer N120). This is either a 16 mm “Malt” speaker from PSS or a MX16 from Sonion.

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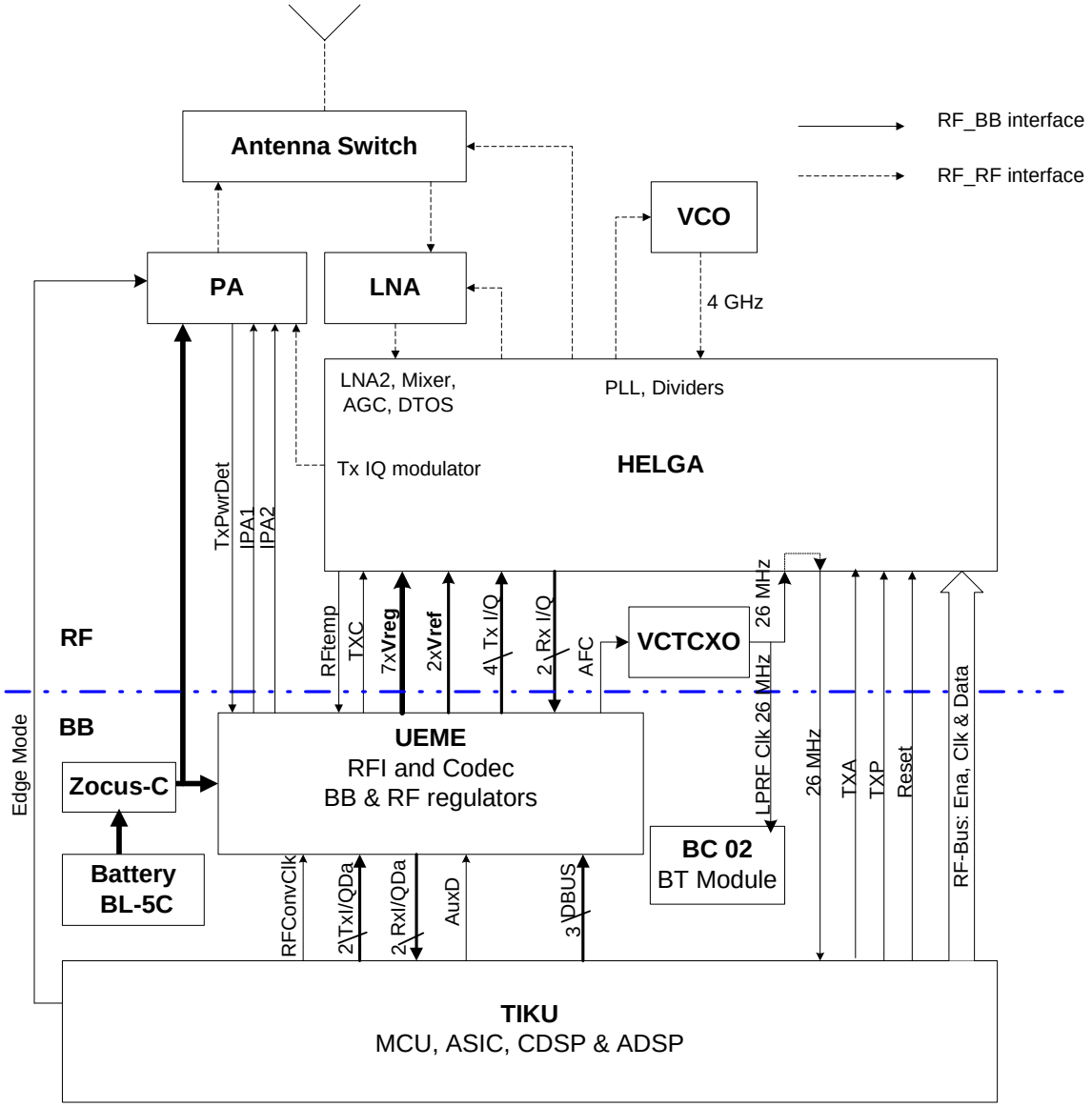
RF interface

The interface between baseband and the RF section is shown below:

Figure 19:Simplified RF/BB Interface Block Diagram



Test pattern

Test pads are placed on engine PWB for service.

RM-72 has adopted the two-row test pattern layout. The basic test pads (FBUS_TX, FBUS_RX, VPP, MBUS & GND) have a defined location, while optional signals can be on either side of the test pads. The ‘DAI_CLK’ is included as an optional signal.

For specific test pad placement, please see the figure below.

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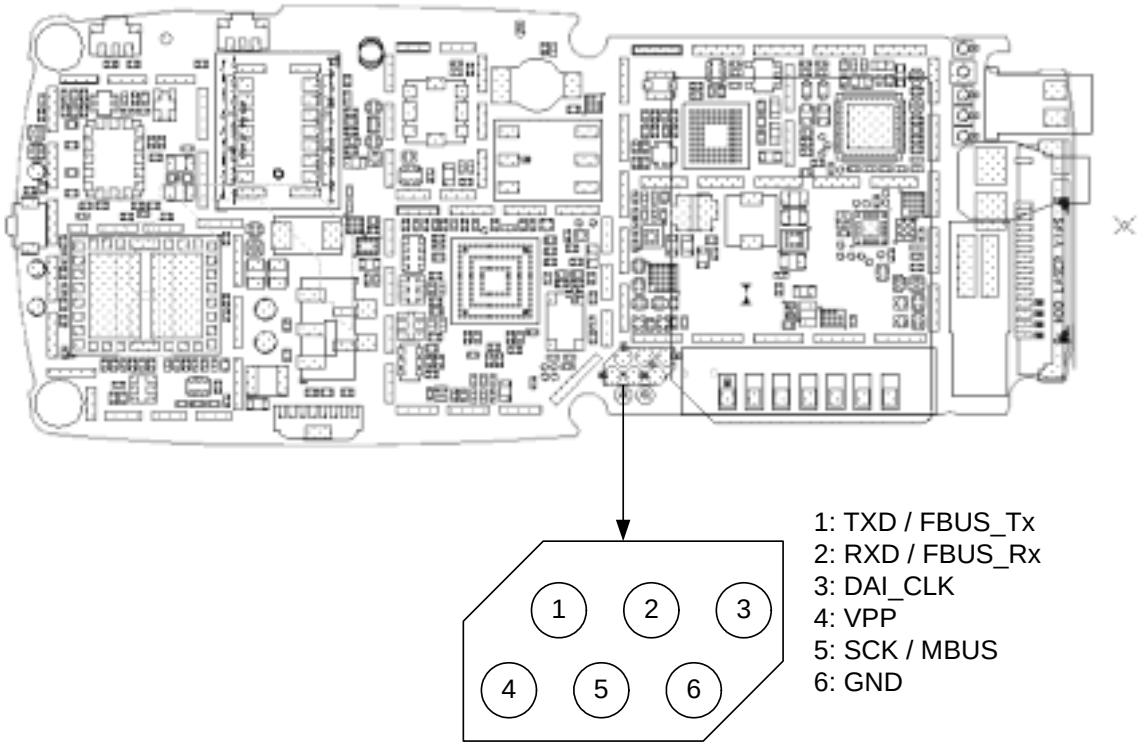
Figure 20:Test Pattern



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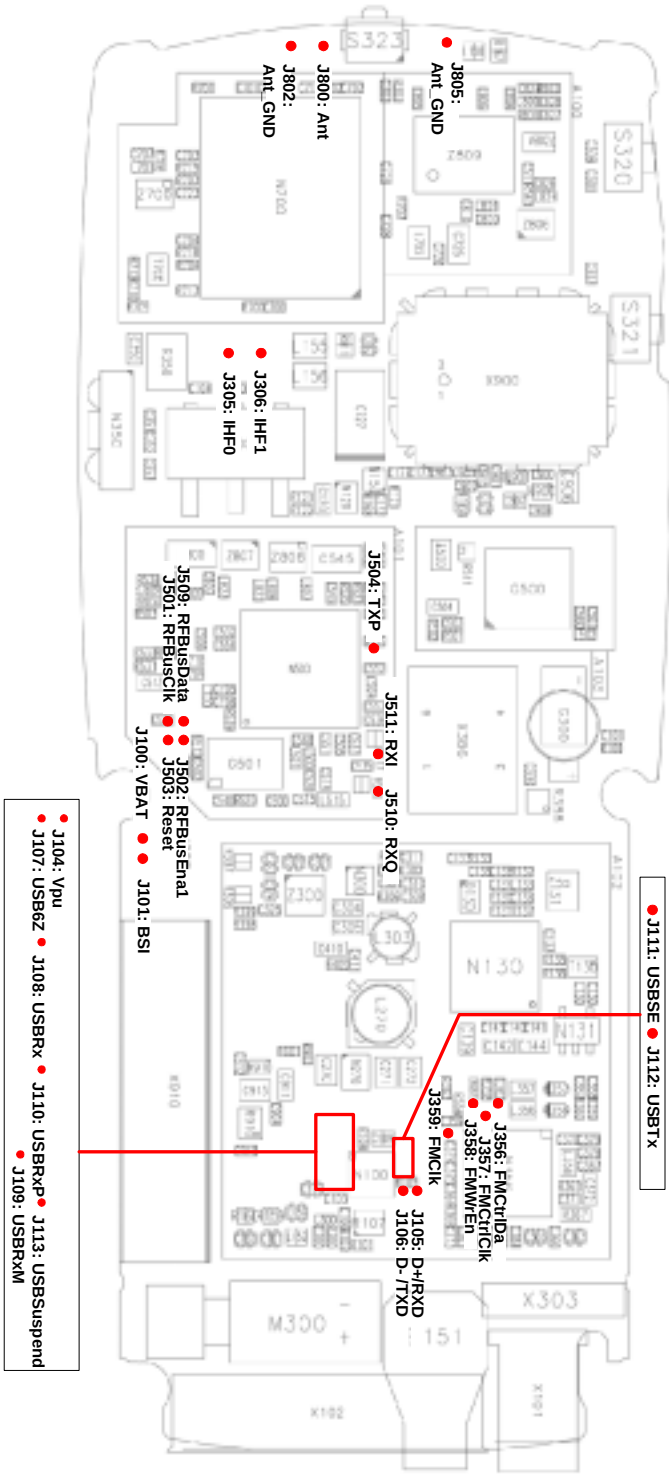
Test Points

See the following two figures for an indication as to where some of the test points can be found. The layouts are from build 1maa_02a.

Main board top side of PWB



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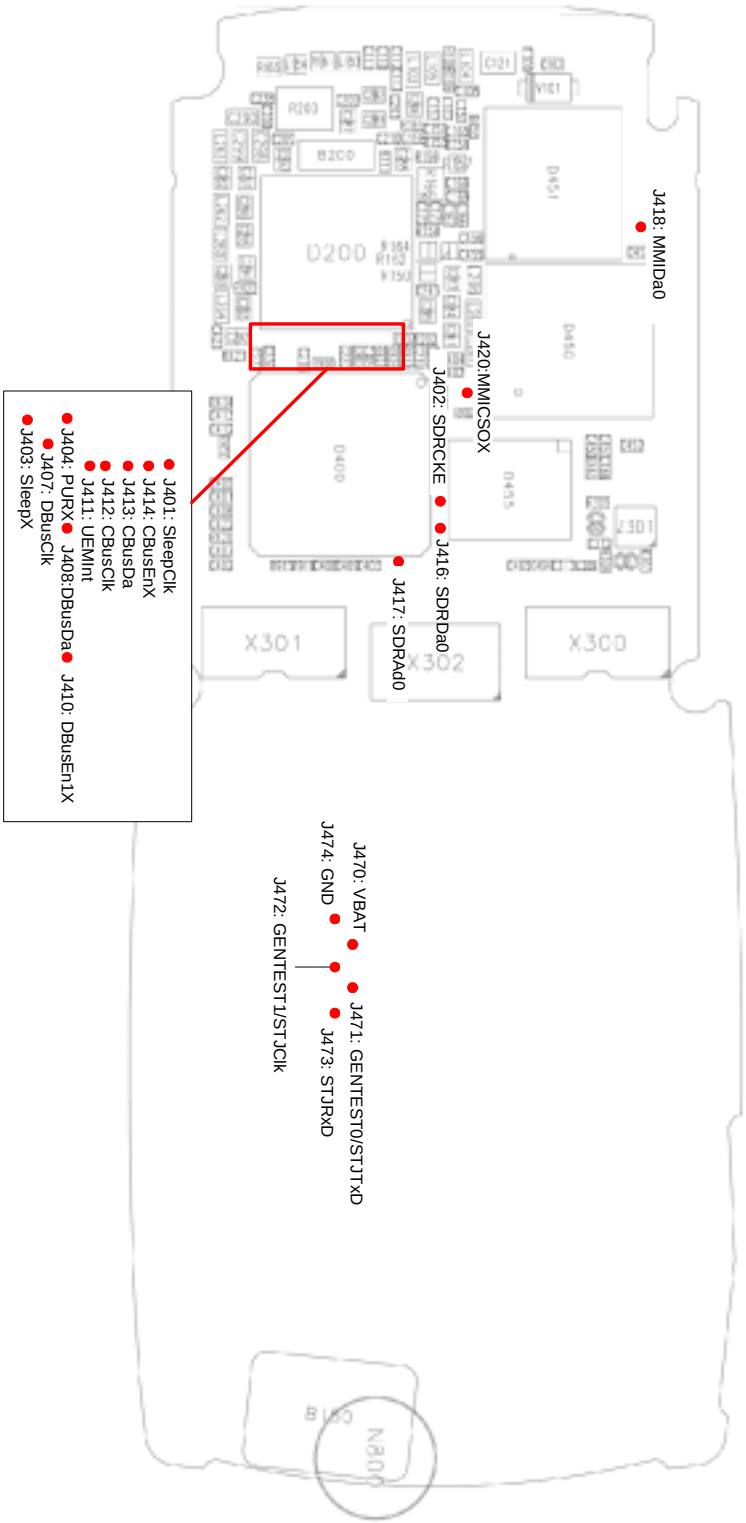
Main board bottom side of PWB



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RF Module Introduction

The RF module performs the necessary high frequency operations of the EGSM900/ GSM1800/GSM1900 triple band (EDGE) engine in the RM-72 product.

Both, the transmitter and receiver have been implemented by using direct conversion architecture, which means that the modulator and demodulator operate at the channel frequency.

The core of the RF is an application-specific integrated circuit, Helgo. Another core component is a power amplifier module, which includes two amplifier chains, one for GSM850/EGSM900 and the other for GSM1800/GSM1900.

Other key components include:

- 26 MHz VCTCXO for frequency reference
- 3296-3980 MHz SHF VCO (super high frequency voltage controlled oscillator)
- front end module comprising a RX/TX switch and two RF bandpass SAW filters
- three additional SAW filters

The control information for the RF is coming from the baseband section of the engine through a serial bus, referred later on as RFBus. This serial bus is used to pass the information about the frequency band, mode of operation, and synthesizer channel for the RF.

In addition, exact timing information and receiver gain settings are transferred through the RF-Bus. Physically, the bus is located between the baseband ASIC called UPP and Helgo. Using the information obtained from UPP, Helgo controls itself to the required mode of operation and further sends control signals to the front end and power amplifier modules. In addition to the RFBus, there are still other interface signals for the power control loop and VCTCXO control and for the modulated waveforms.

The RF circuitry is located on the top side of the 8 layer PWB.

EMC leakage is prevented by using a metal cans. The RF circuits are separated to three blocks:

- FM radio
- PA, front end module, LNA and 1900 band SAWs
- Helgo RF IC, VCO, VCTCXO, baluns and balanced filters

The RF transmission lines constitute of striplines and microstriplines after PA.

The baseband circuitry is located on the one side of the board, which is shielded with a meallized frame and ground plane of the UI-board.

RF frequency plan

RF frequency plan is shown below. The VCO operates at the channel frequency multiplied by two or four, depending on the frequency band of operation. This means that the baseband-modulated signals are directly converted up to the transmission frequency and the received RF signals directly down to the baseband frequency.

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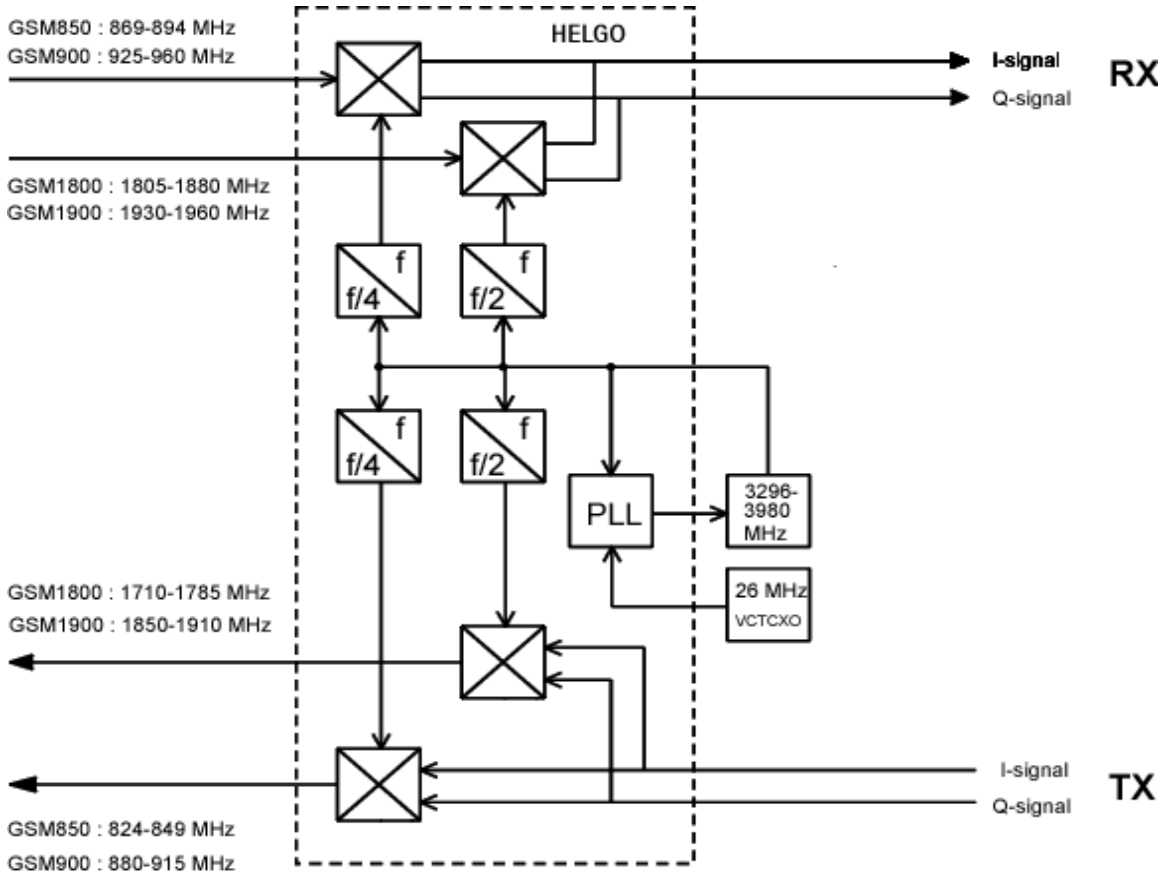
Figure 21:RF Frequency Plan



DC characteristics

Regulators

The transceiver baseband section has a multi-function analog ASIC, UEM, which contains among other functions six pieces of 2.78 V linear regulators and a 4.8 V switching regulator.

All regulators can be controlled individually by the 2.78 V logic directly or through a control register.

The use of the regulators can be seen in the power distribution diagram, which is presented in the Figure Power Distribution Diagram below.

The seven regulators are named VR1 to VR7. VrefRF01 and VrefRF02 are used as the reference voltages for the Helgo, VrefRF01 (1.35V) for the bias reference and VrefRF02 (1.35V) for the RX ADC (analog-to-digital converter) reference.

The regulators (except for VR7) are connected to the Helgo. Different modes of operation can be selected inside the Helgo according to the control information coming through the RFBus.

Table 9: List of the needed supply voltages

Volt. Source	Load
VR1	PLL charge pump (4.8 V)
VR2	TX modulators, VPECTRL3s (ALC), driver

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VR3	VCTCXO, synthesizer digital parts
VR4	Helgo pre-amps, mixers, DtoS
VR5	dividers, LO-buffers, prescaler
VR6	LNAs, Helgo baseband (Vdd_bb)
VR7	VCO
VrefRF01	ref. Voltage for Helgo
VrefRF02	ref. Voltage for Helgo
Vbatt	PA

Typical Current Consumption

The table below shows the typical current consumption in different operation modes.

Table 10: Typical current consumption in different operation modes

Operation mode	Current consumption	Notes
Power OFF	< 10 uA	Leakage current (triple band PA)
RX, EGSM900	75 mA, peak	
RX, GSM1800/ GSM1900	70 mA, peak	
TX, power level 5, EGSM900	1700 mA, peak	
TX, power level 0, GSM1800/GSM1900	1000 mA, peak	

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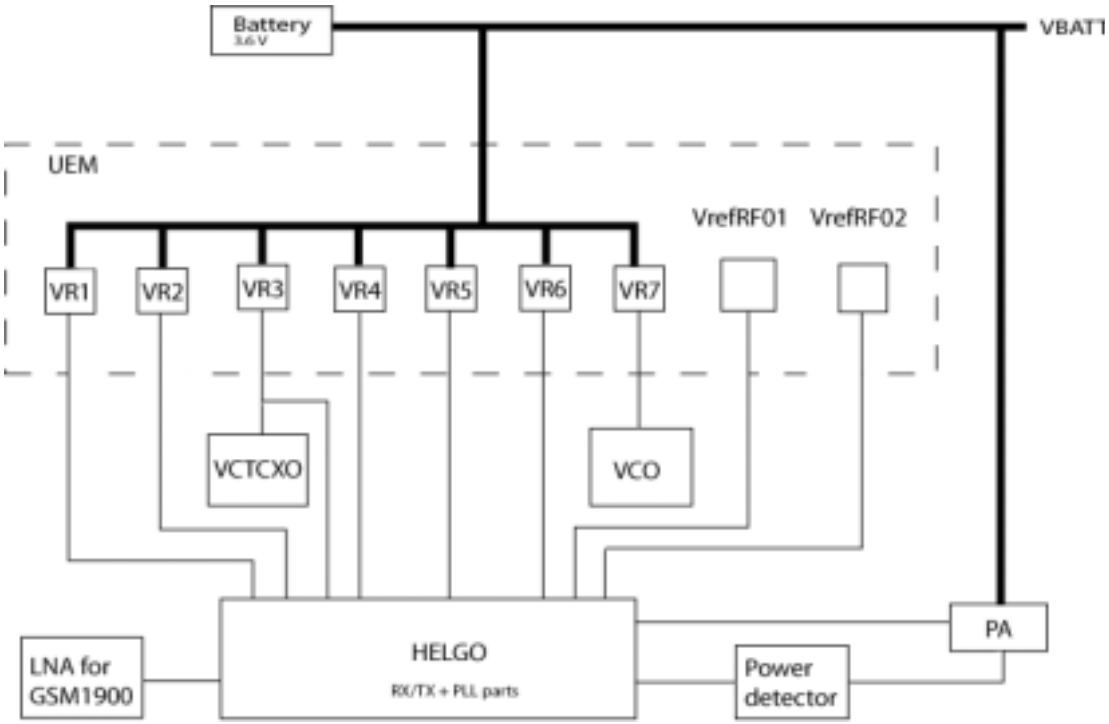
Power distribution

Figure 22:Power Distribution Diagram



RF characteristics

Table 11: Channel Numbers and Frequencies

System	Channel number	TX frequency	RX frequency	Unit
GSM850	128 <= n <= 251	F = 824.2 + 0.2∗(n – 128)	F = 869.2 + 0.2∗(n-128)	MHz
GSM900	0 < =n <=124	F = 890 + 0.2∗n	F = 935 + 0.2∗n	MHz
	975<= n <= 1023	F = 890 + 0.2∗ (n -1024)	F = 935 + 0.2∗(n -1024)	MHz
GSM1800	512 <= n <= 885	F = 1710.2 + 0.2∗ (n-512)	F = 1805.2 + 0.2∗ (n-512)	MHz
GSM1900	512 <= n <=810	F = 1850.2 + 0.2∗ (n-512)	F = 1930.2 + 0.2∗ (n-512)	MHz

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Table 12: Main RF Characteristics

Parameter	Unit and value
Cellular system[RM-72]	EGSM900/GSM1800/GSM1900
RX Frequency range	GSM850: 869 … 894 MHz EGSM900: 925 ... 960 MHz GSM1800: 1805...1880 MHz GSM1900: 1930...1990 MHz
TX Frequency range	GSM850: 824 … 849 MHz EGSM900: 880 ... 915 MHz GSM1800: 1710 ...1785 MHz GSM1900: 1850 …1910 MHz
Duplex spacing	GSM850: 45 MHz EGSM900: 45 MHz GSM1800: 95 MHz GSM1900: 80 MHz
Channel spacing	200 kHz
Number of RF channels	GSM850: 124 EGSM900: 174 GSM1800: 374 GSM1900: 300
Output Power	GSM850: GSMK 5…33 dBm GSM850: 8-PSK 5…27 dBm EGSM900: GSMK 5…33 dBm EGSM900: 8-PSK 5…27 dBm GSM1800: GSMK 0…30 dBm GSM1800: 8-PSK 0…26 dBm GSM1900: GSMK 0…30 dBm GSM1900: 8-PSK 0…26 dBm
Number of power levels GMSK	GSM850: 15 EGSM900: 15 GSM1800: 16 GSM1900: 16
Number of power levels 8-PSK	GSM850: 12 EGSM900: 12 GSM1800: 14 GSM1900: 14

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Table 13: Transmitter Characteristics

Item	Values (EGSM900/1800/1900)
Type	Direct conversion, nonlinear, FDMA/TDMA
LO frequency range	GSM850: 3296…3395 MHz (4 x TX freq) EGSM900: 3520...3660 MHz (4 x TX freq) GSM1800: 3420...3570 MHz (2 x TX freq) GSM1900: 3700...3820 MHz (2 x TX freq)
Output power (GSM850/EGSM900/GSM1800/GSM1900)	GMSK 33/33/30/30 dBm 8-PSK 27/27/26/26 dBm

Table 14: Receiver Characteristics

Item	Values, EGSM900/1800/1900
Type	Direct conversion, Linear, FDMA/TDMA
LO frequencies	GSM850: 3476…3575 MHz (4 x RX freq) EGSM900: 3700...3840 MHz (4 x RX freq) GSM1800: 3610...3760 MHz (2 x RX freq) GSM1900: 3860...3980 MHz (2 x RX freq)
Typical 3 dB bandwidth	+/- 91 kHz
Sensitivity	min. - 102 dBm (normal condition)
Total typical receiver voltage gain (from antenna to RX ADC)	86 dB
Receiver output level (RF level -95 dBm)	230 mVpp, single-ended I/Q signals to RX ADCs

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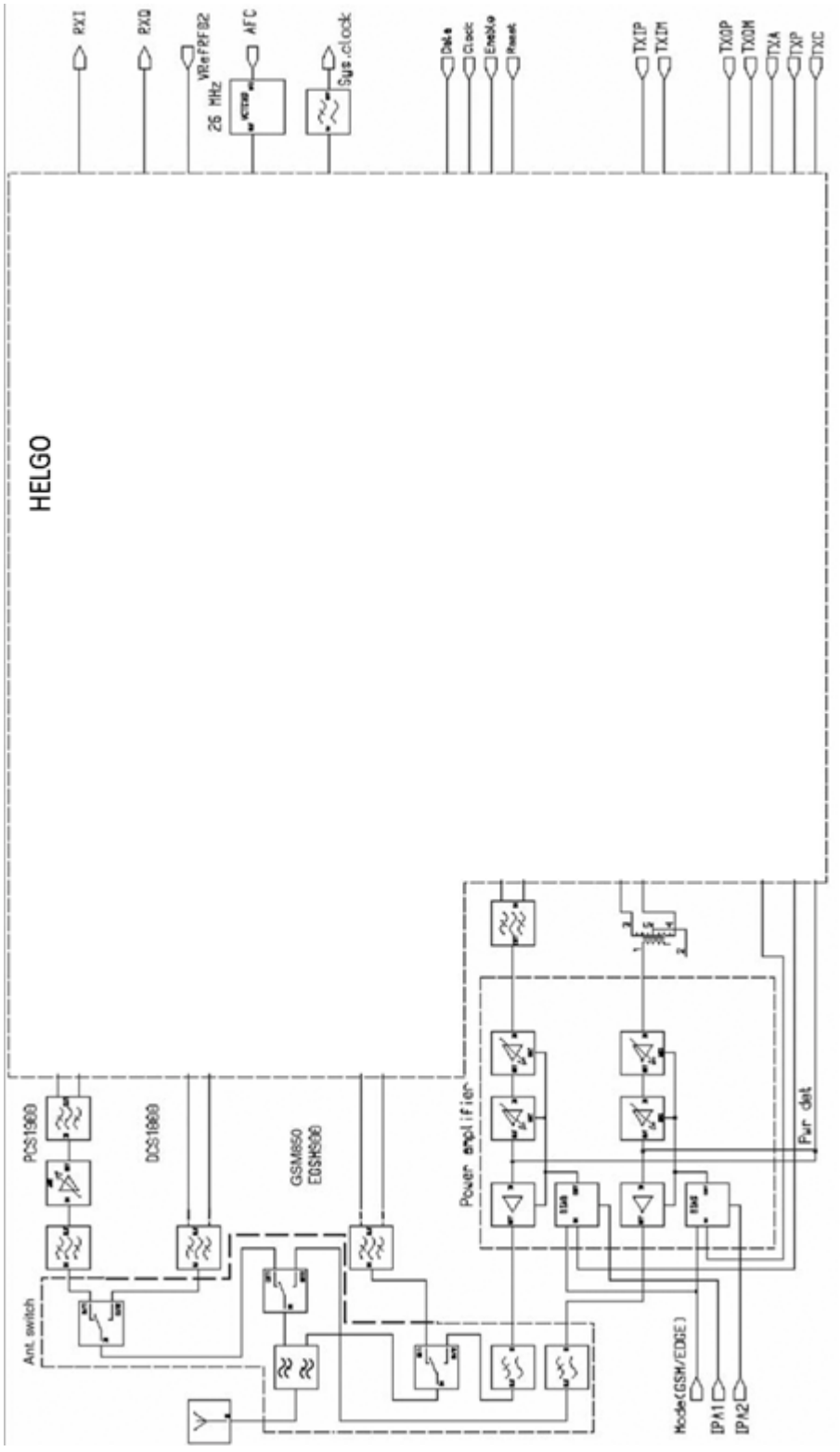
RF block diagram

The block diagram of the RF module can be seen in the following figure. The detailed functional description is given in the following sections.

Figure 23:RF Block Diagram



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Frequency synthesizers

The VCO frequency is locked by a PLL (phase locked loop) into a stable frequency source given by a VCTCXO, which is running at 26 MHz. The frequency of the VCTCXO is in turn locked into the frequency of the base station with the help of an AFC voltage, which is generated in UEM by an 11 bit D/A converter. The PLL is located in Helgo and it is controlled through the RFBus.

The required frequency dividers for modulator and demodulator mixers are integrated in Helgo.

The loop filter filters out the comparison pulses of the phase detector and generates a DC control voltage to the VCO. The loop filter determines the step response of the PLL (settling time) and contributes to the stability of the loop.

The frequency synthesizer is integrated in Helgo except for the VCTCXO, VCO, and the loop filter.

Receiver

Each receiver path is a direct conversion linear receiver. From the antenna the received RF signal is fed to a front-end module where a diplexer first divides the signal to two separate paths according to the band of operation: either lower, GSM850/EGSM900 or upper, GSM1800/ GSM1900 path.

Most of the receiver circuitry is included in Helgo.

Transmitter

The transmitter consists of two final frequency IQ-modulators and power amplifiers, for the lower and upper bands separately, and a power control loop. The IQ-modulators are integrated in Helgo, as well as the operational amplifiers of the power control loop. The two power amplifiers are located in a single module with power detector. In the GMSK mode the power is controlled by adjusting the DC bias levels of the power amplifiers.

Front end

The front end features include:

- Antenna 50 ohm input
- RX GSM850/EGSM900 balanced output
- RX GSM1800 balanced output
- RX GSM1900 single ended output
- TX GSM850/GSM900 single ended 50 ohm input
- TX GSM1800/GSM1900 single ended 50 ohm input
- 3 control lines from the Helgo

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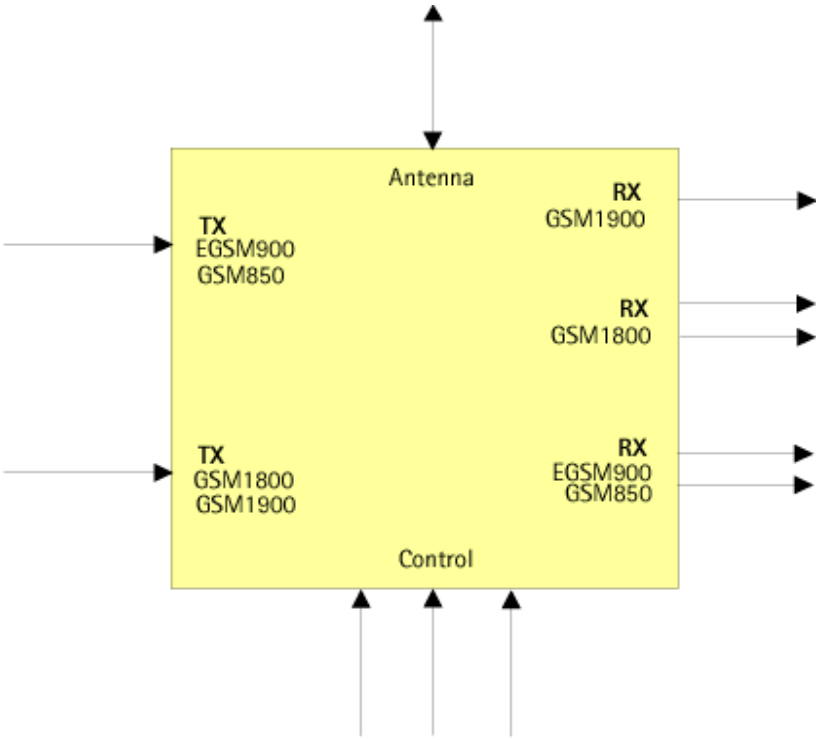
Figure 24:Front End

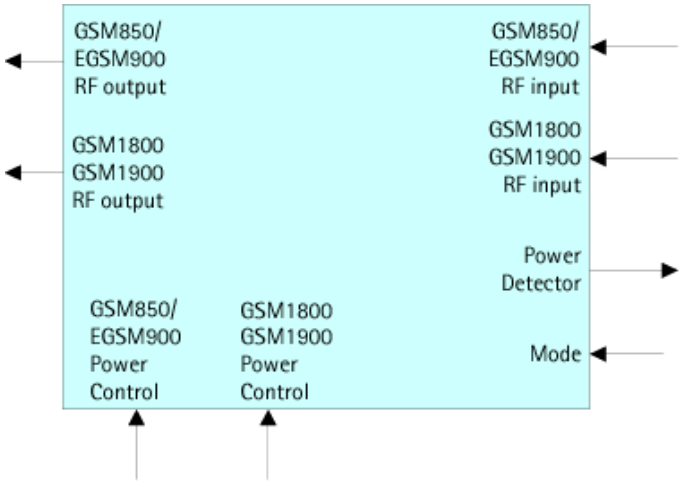


Power amplifier

The power amplifier features include:

- 50 ohm input and output, GSM850/EGSM900 and GSM1800/GSM1900
- Internal power detector
- GMSK and EDGE mode

Figure 25:Power Amplifier



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RF ASIC Helgo

The RF ASIC features include

- Package uBGA108
- Balanced I/Q demodulator and balanced I/Q modulator
- Power control operational amplifier, acts as an error amplifier
- The signal from VCO is balanced, frequencies 3296 to 3980 MHz
- Low noise amplifiers (LNAs) for GSM850/EGSM900 and GSM1800 are integrated

The Helgo can be tested by test points only.

AFC function

AFC is used to lock the transceiver's clock to the frequency of the base station.

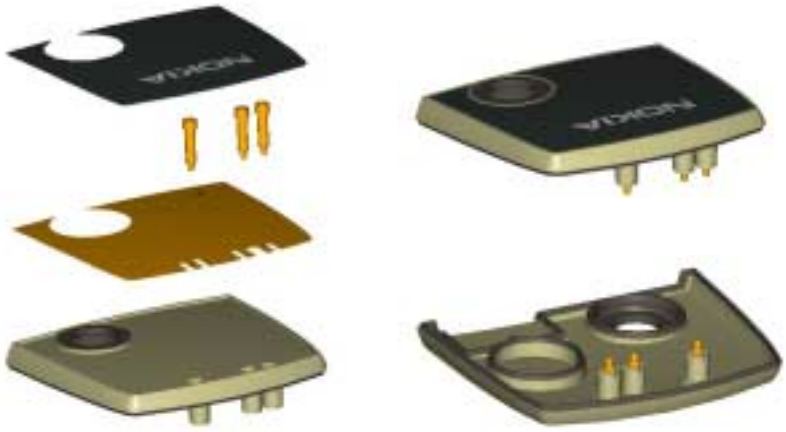
Antenna

The antenna for RM-72 is a triple band antenna.

Two versions:

- RM-72: GSM900/GSM1800/GSM1900

Antenna concept: Flex print on substrate covered with decorated label



The antenna also works as cover for the IHF-speaker (Internal Handsfree Speaker). The IHF sound chamber and the camera are sealed with a rubber gasket (part of the antenna).

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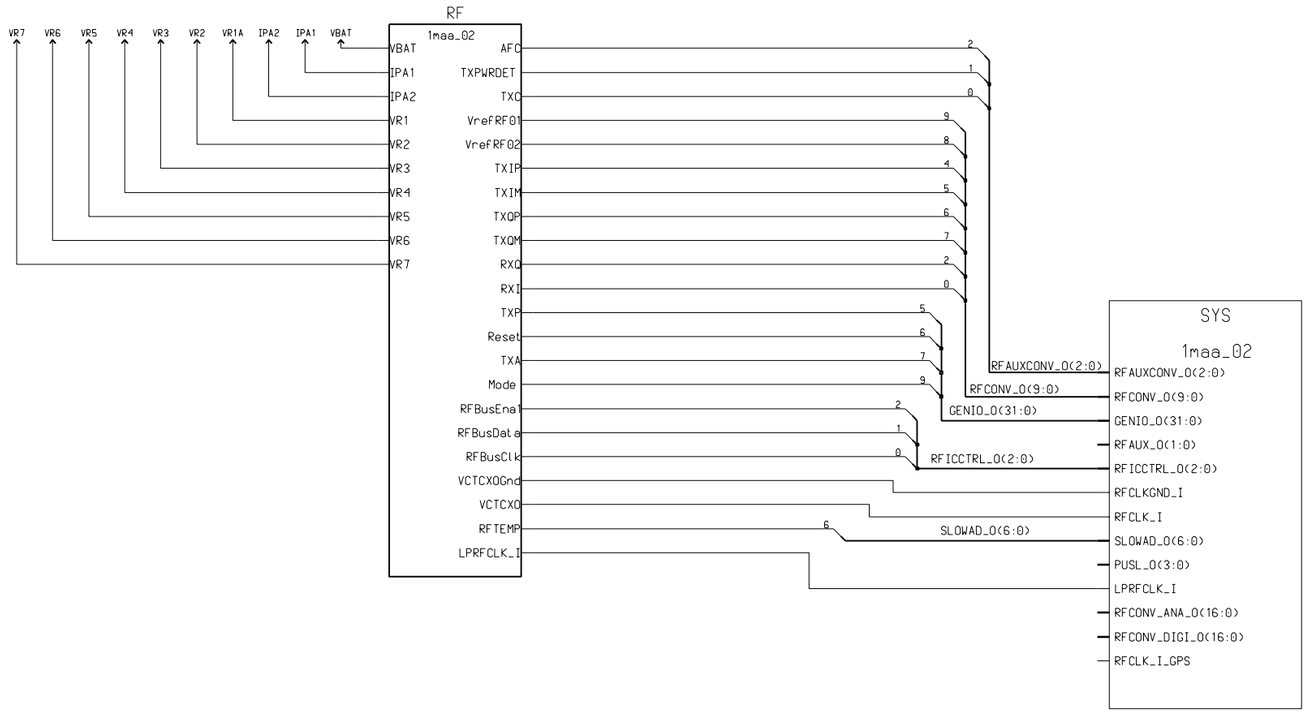
Top Level, 1maa_02, v.0 ed. 40



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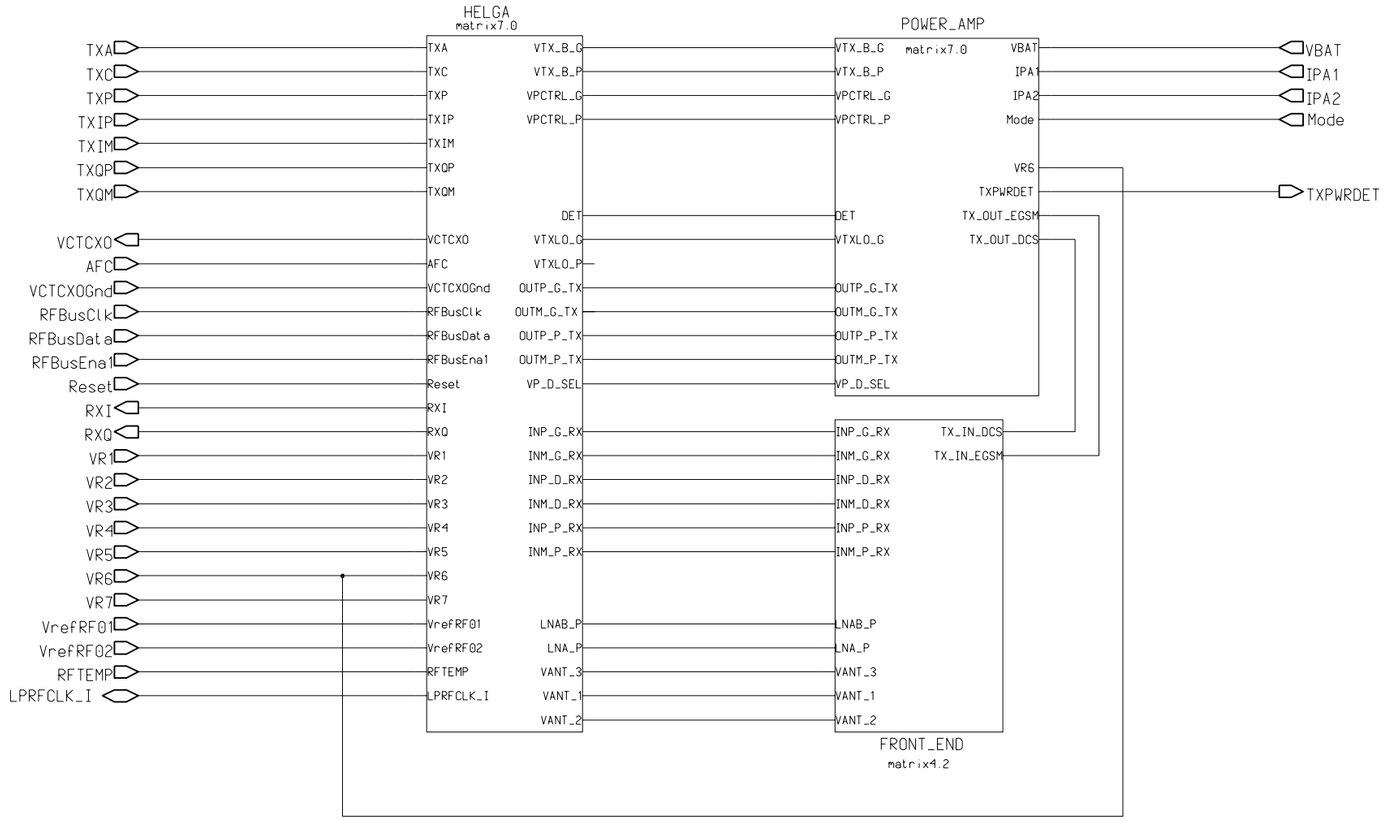
RF Top Level,1maa_02, v. 0.0 ed. 67



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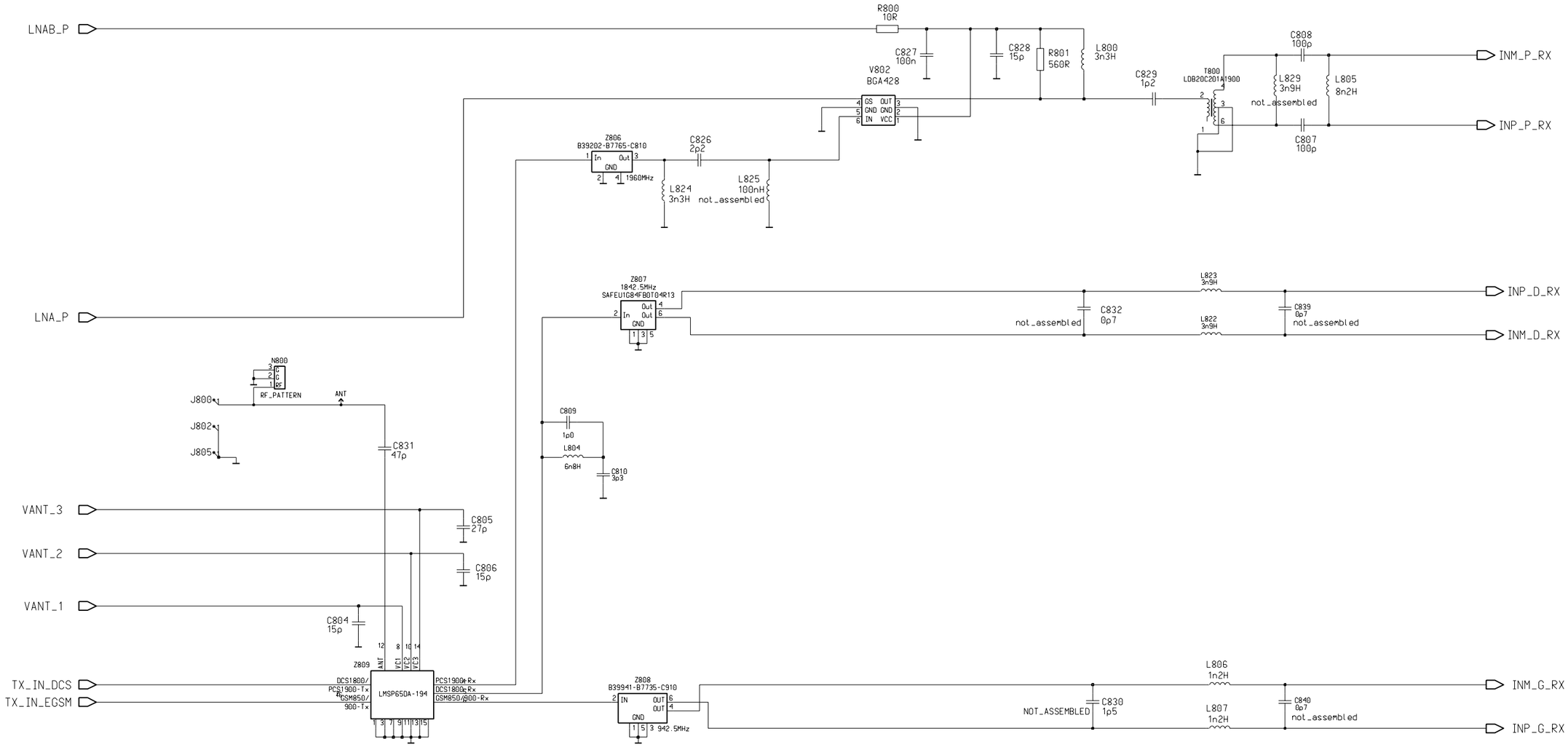
RX Front End and Antenna Switch, 1maa_02, v. 0.0 ed. 79



Last references:
C840
R807
L828
Z809
V800

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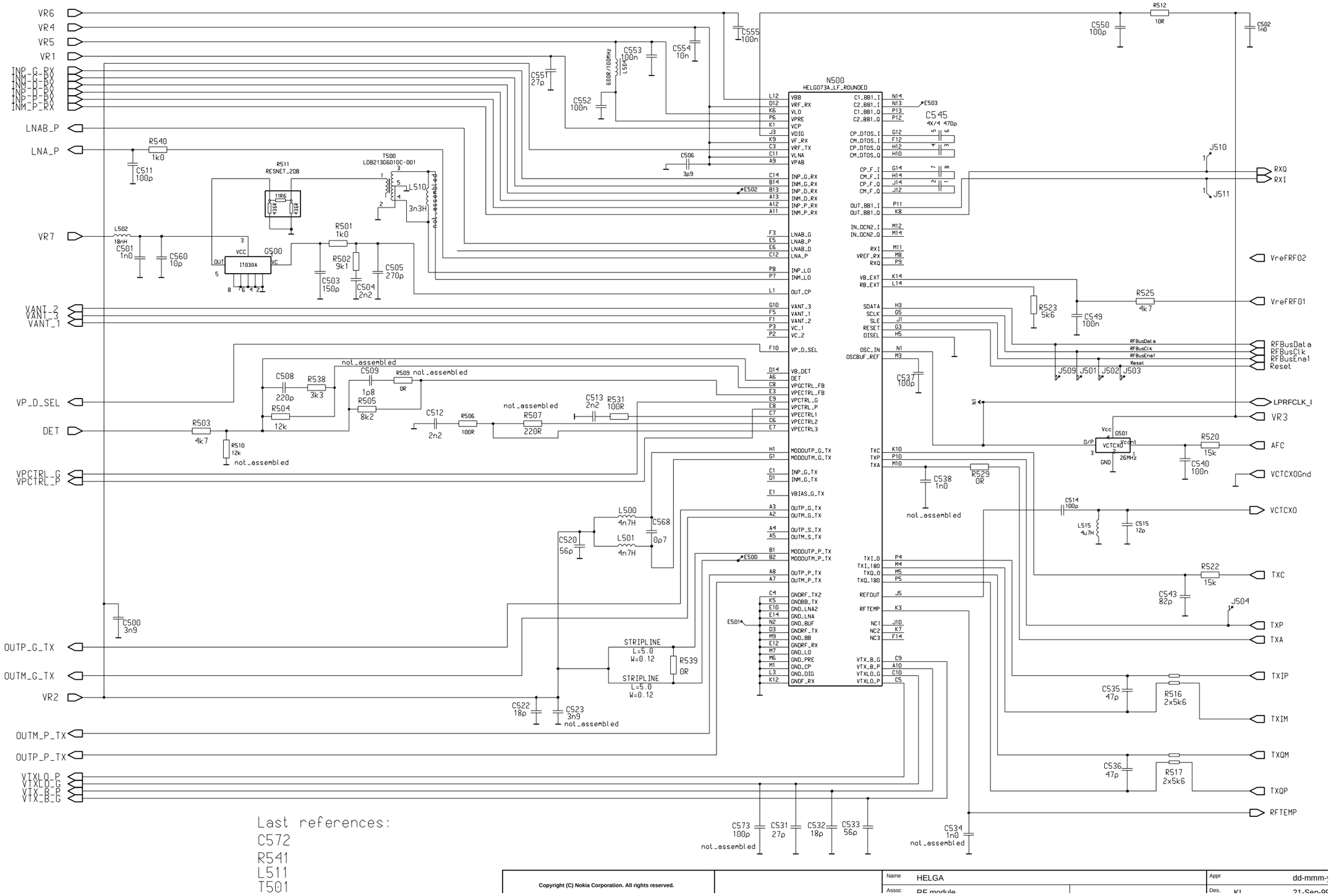
HELGA, 1maa_02, ed. 98



Last references:
C572
R541
L511
T501

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Name	HELGA	Appr	dd-mmm-y
Assoc	RF module	Des.	KL 21-Sep-9

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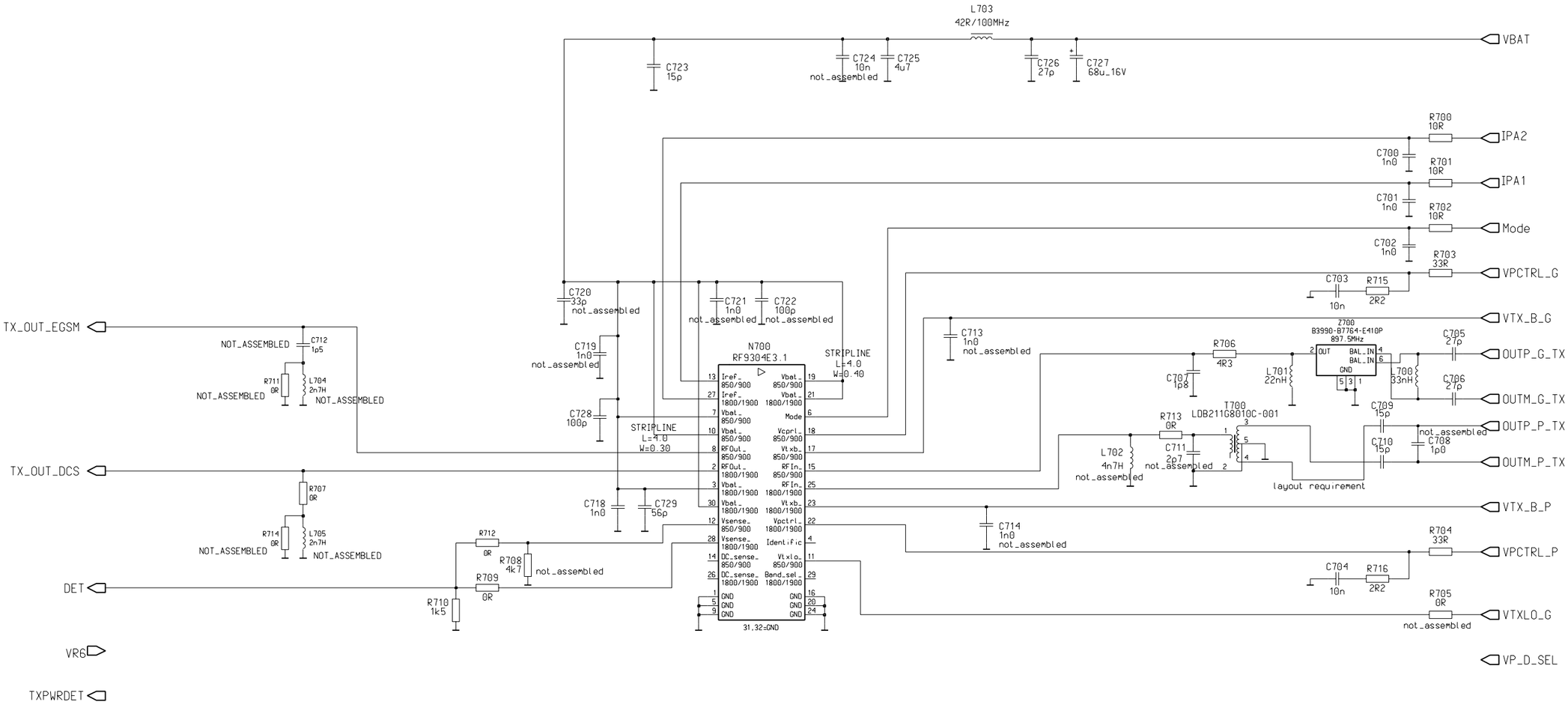
RF9204 Power Amplifier and Power Detection, 1maa_02, v. 0.2 ed. 65



Last references:
C731
R714
L705

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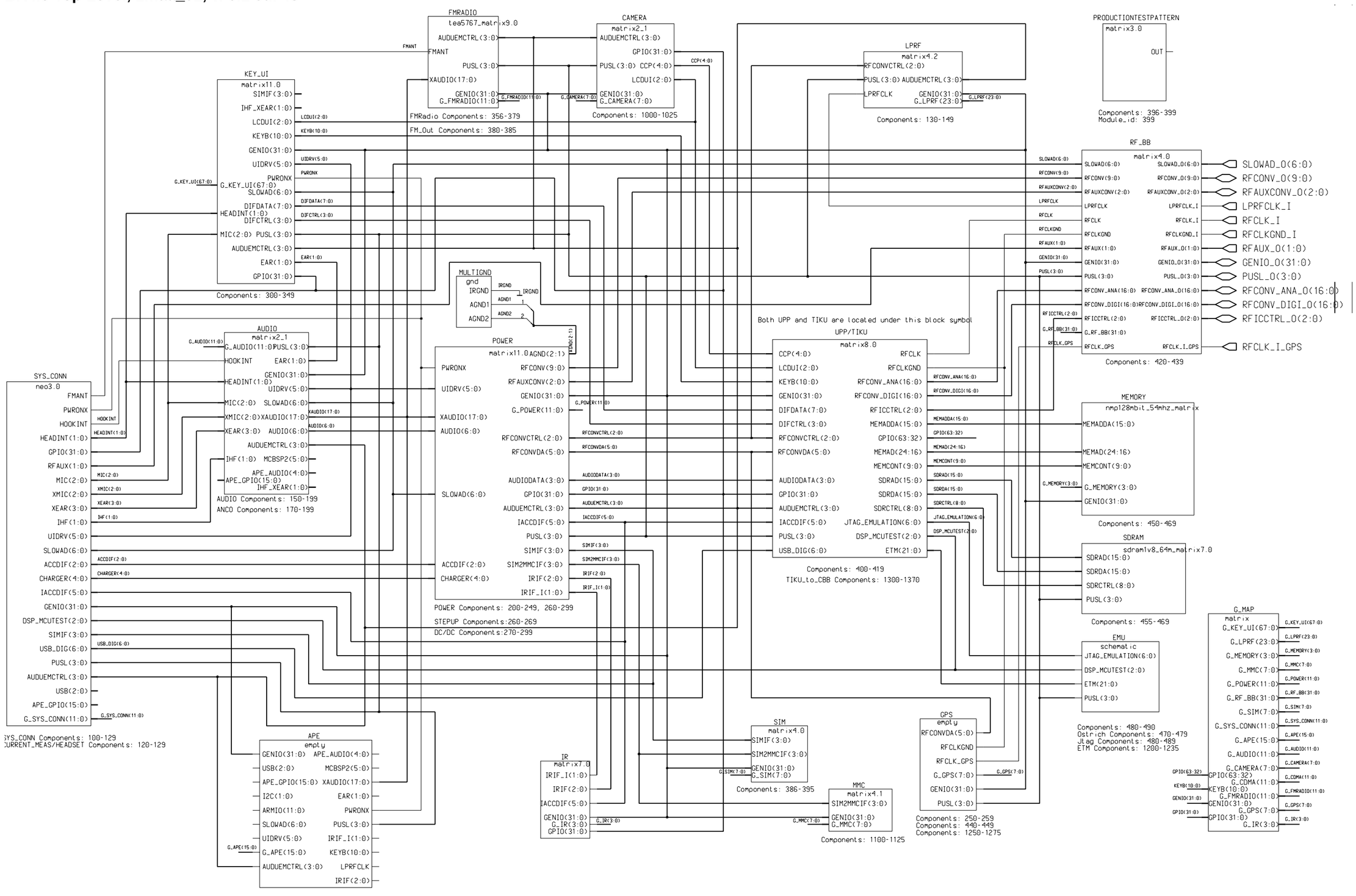
BR4.5 Top Level, 1maa_02, v. 6.1 ed. 43



BR45 Audio, 1maa_02, v. 1.6 ed. 190

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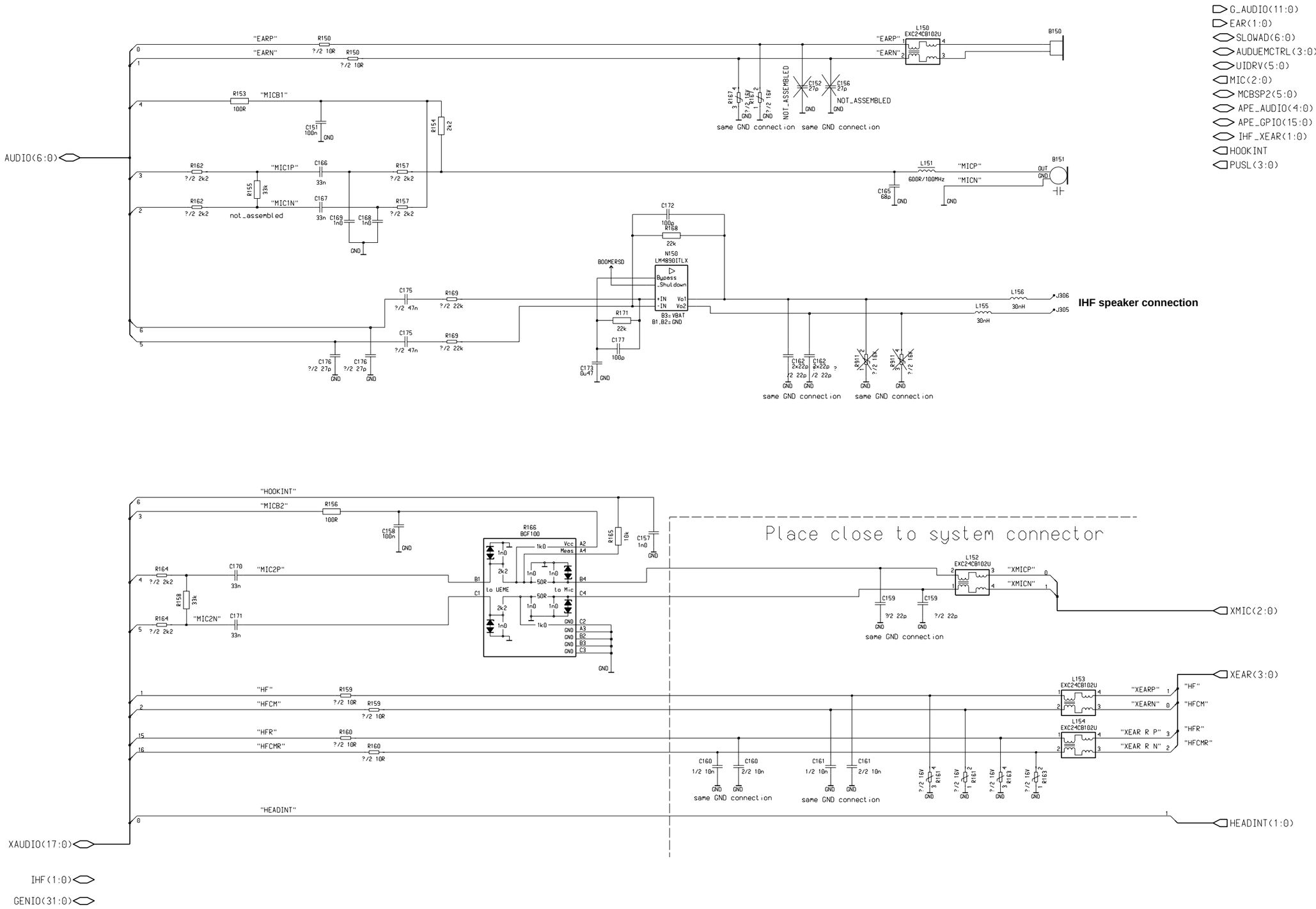

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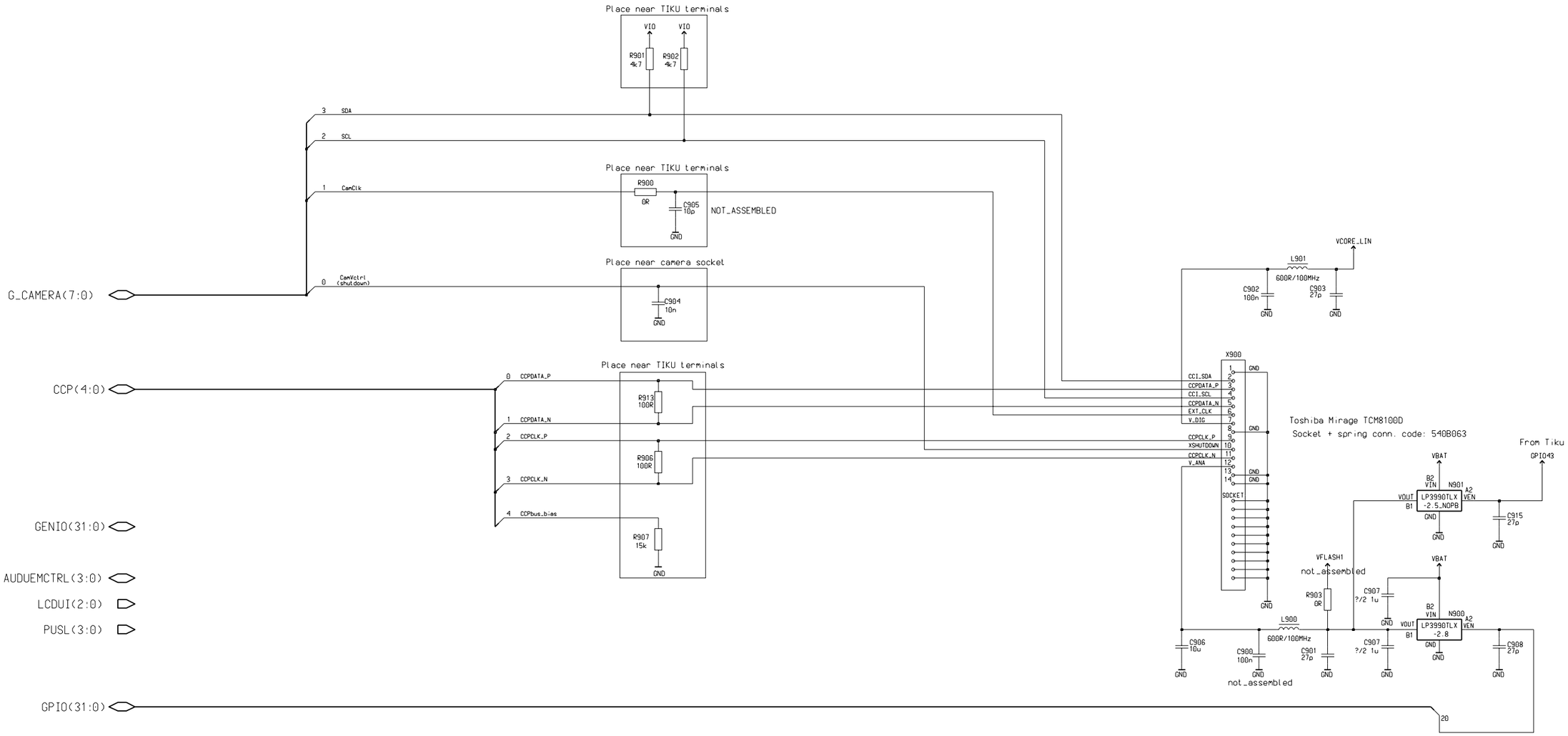
Mirage 2 VGA Camera, 1maa_02, v. 1.1 ed. 206



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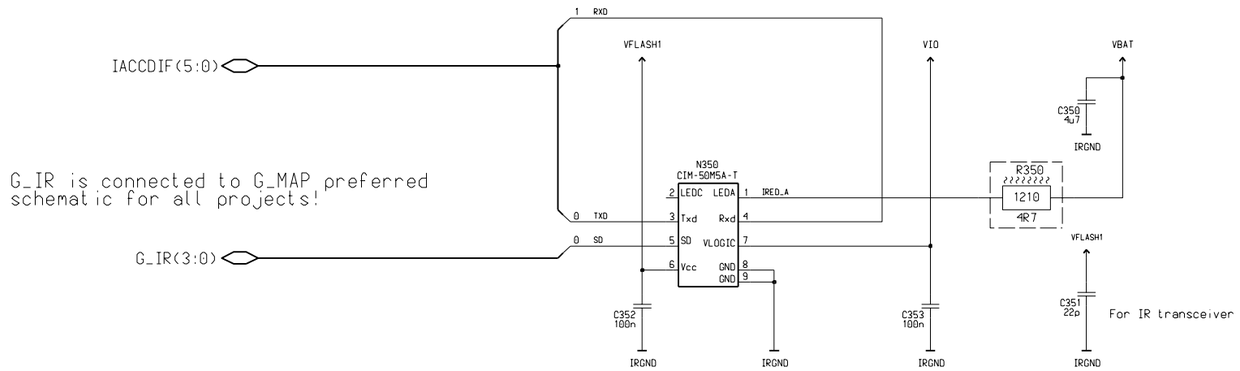
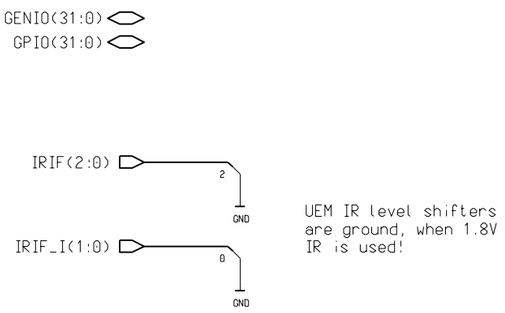
Citizen IR Module 1.8V, 1maa_02, v. 6.1.8 ed. 56





Used referenses

C 350 - 353
N 350
R 350

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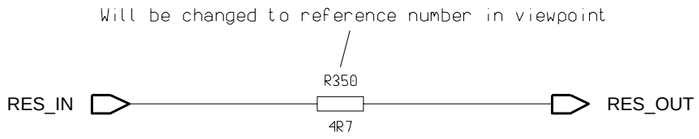
IR Resistor 1210, 1maa_02, v. 0 ed. 6



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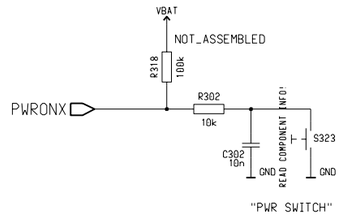
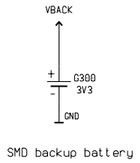
Key UI, 1maa_02, v. 1 ed. 350

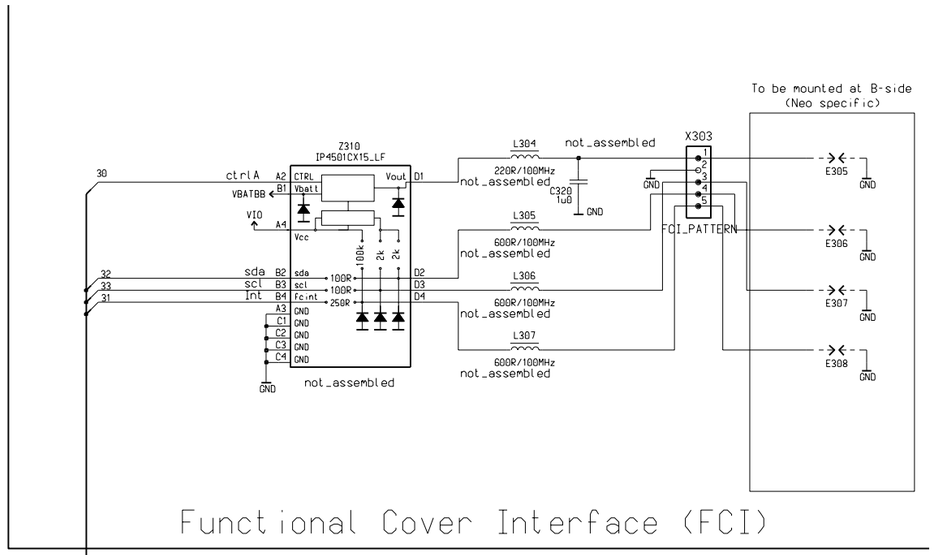
MIC(2:0)
PUSL(3:0)
AUDUEMCTRL(3:0)
LCDUI(2:0)
EAR(1:0)
HEADINT(1:0)
SIMIF(3:0)
IHF_XEAR(1:0)
SLOWAD(6:0)
GENIO(31:0)
KEYB(10:0)
GPIO(31:0)

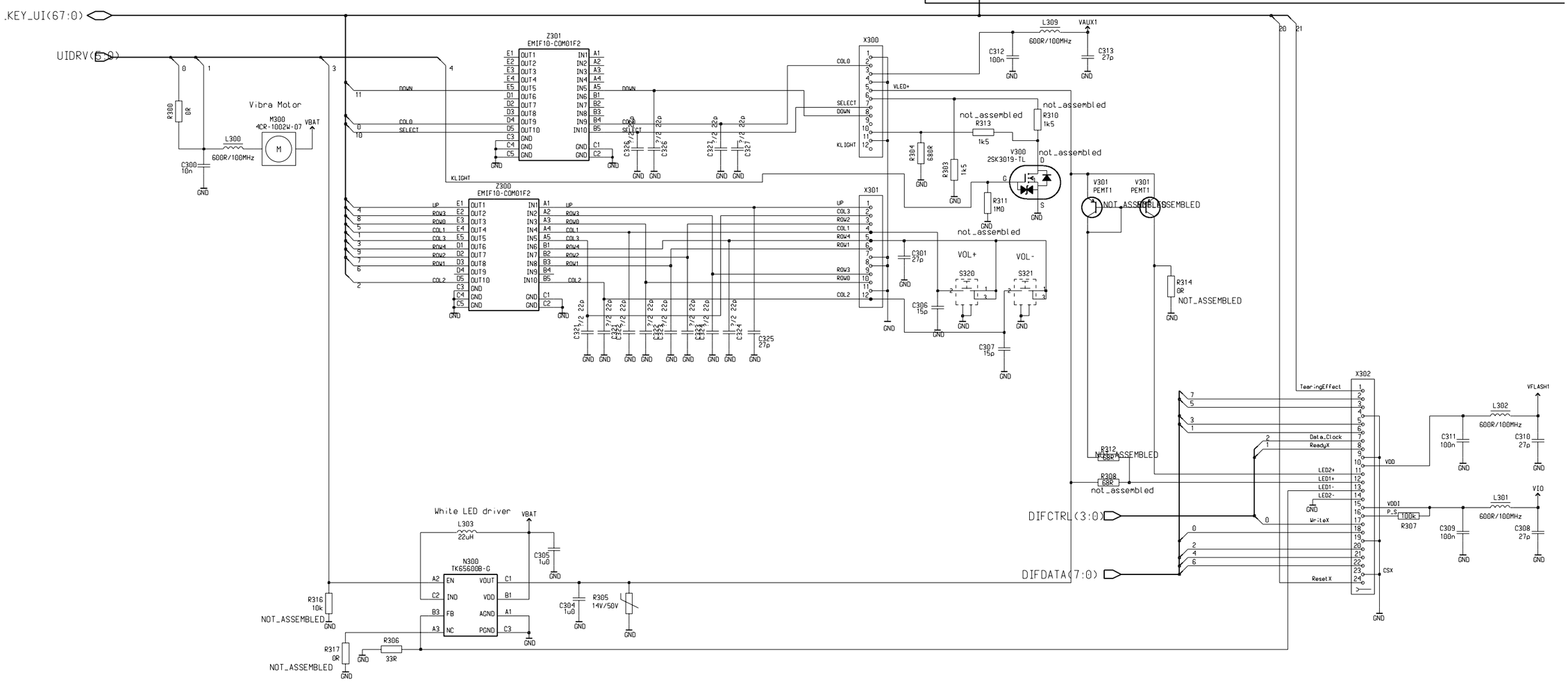


"PWR SWITCH"



SMD backup battery





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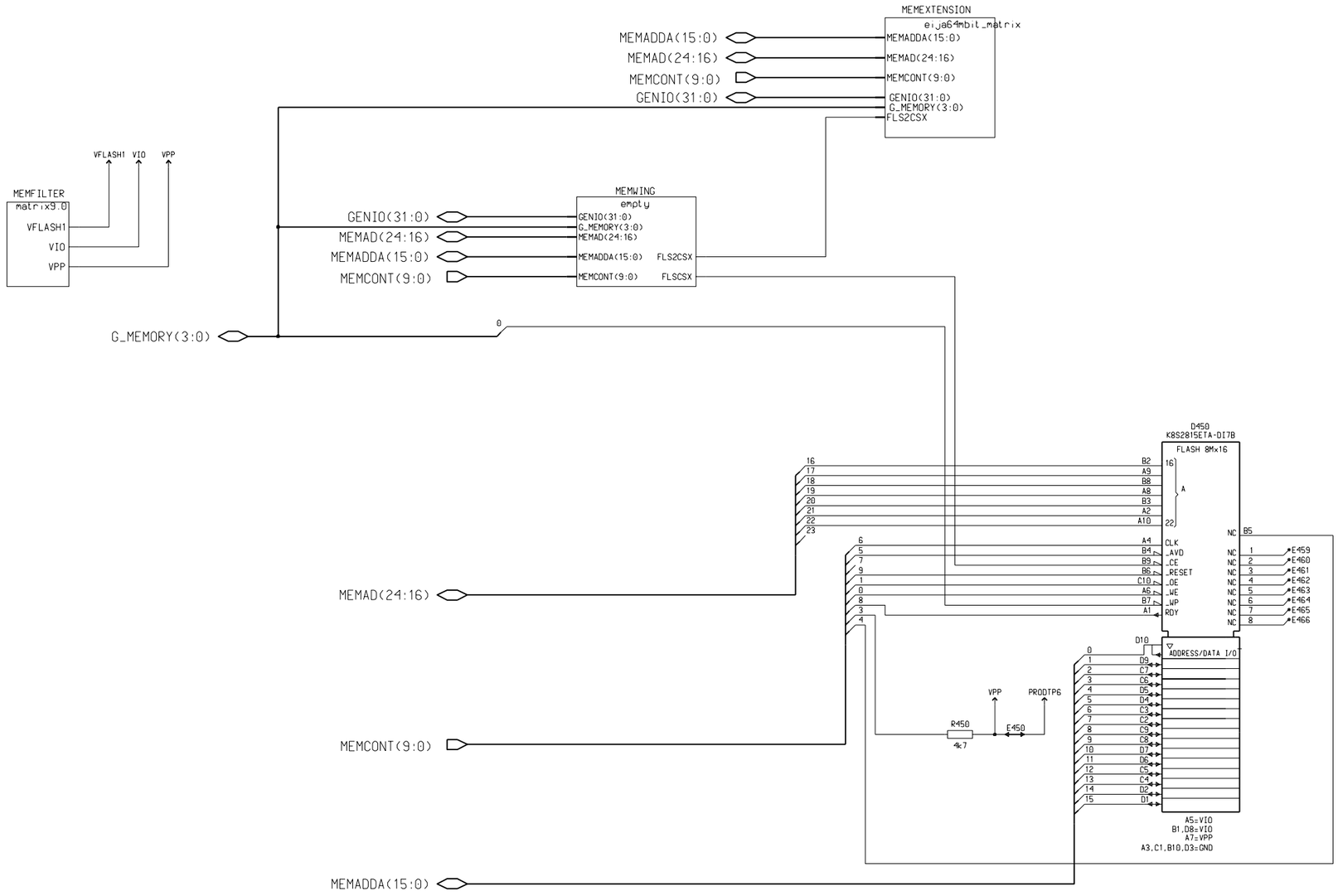
Flash Memory 128 Mbit, 1maa_02, v. 2.0 ed. 81



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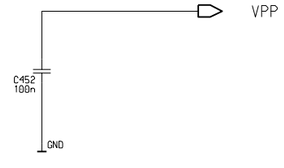
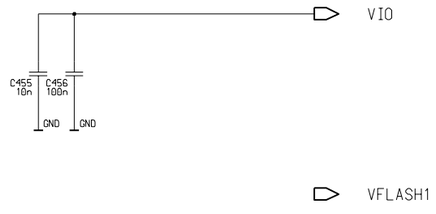
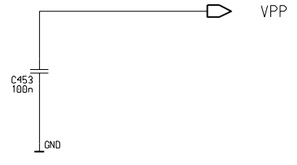
Discrete Capacitors for two Memories without VFlash1, 1maa_02, v. 1.3 ed. 14

Decoupling capacitors for 1st flash



Decoupling capacitors for 2nd flash





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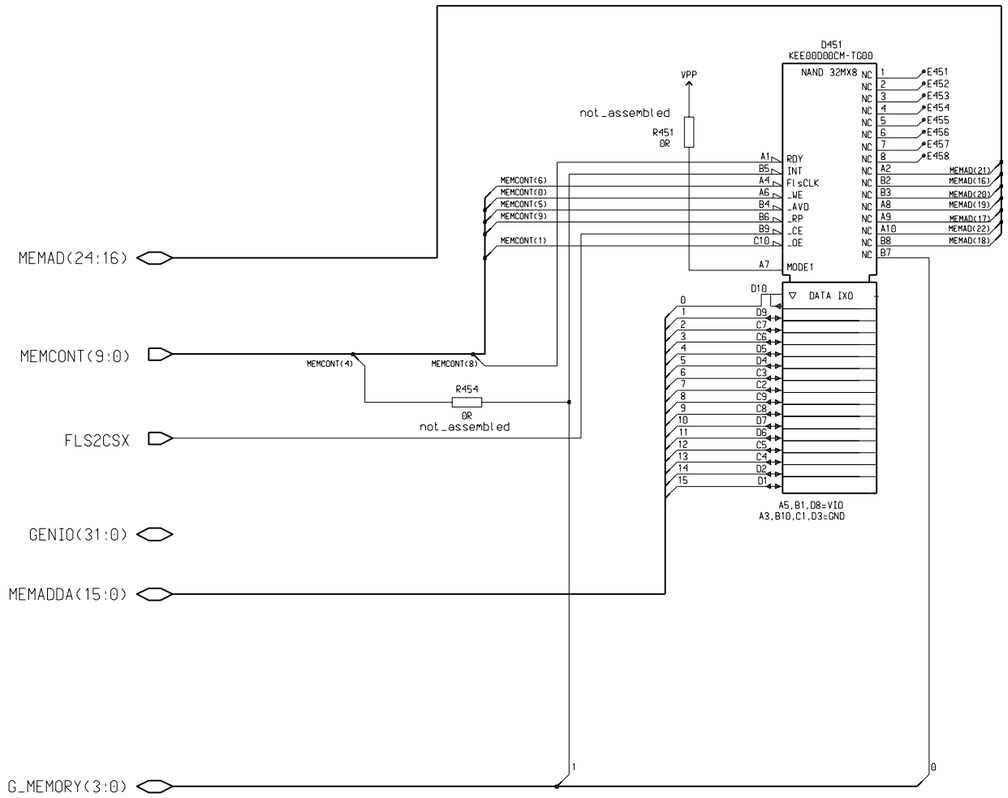
Flash Memory 64 Mbit NAND, 1maa_02, v. 2.0 ed. 68



Resistors R451 and R454 are added into schematics to make it possible to replace NAND FLASH by NOR FLASH if necessary. Later when NAND FLASH will achieve more mature state, these resistors will be removed.

In case of NAND FLASH, memory pin A7 and B7 need to be n.c. on PWB. B5 need to be connected to GENIO(13) only.

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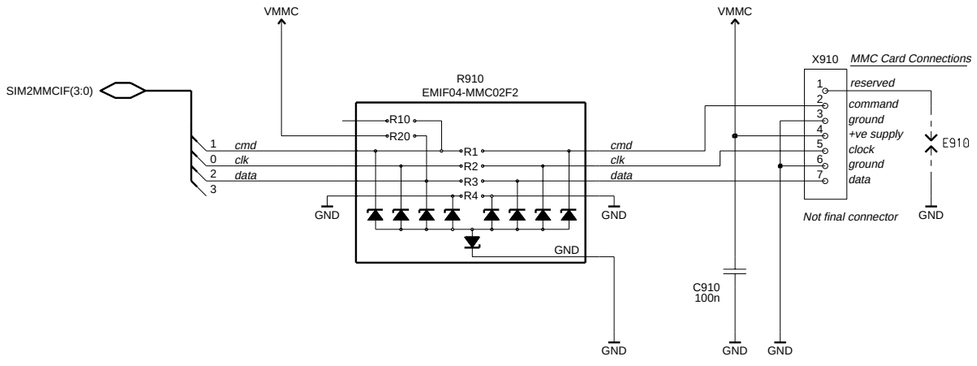
MMC Interface, 1maa_02, v. 2.1 ed. 80

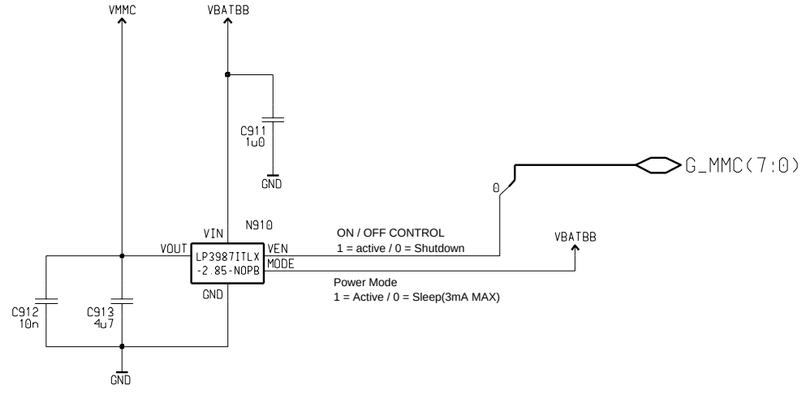


NOTE: The MMC specification imposes the following impedance limits

Command pullup resistance 4.7k to 100k
Data pullup resistance 50k to 100k

EMIF02-MMC R10=13k (therefore only suitable for command line)
EMIF02-MMC R20=56k (therefore only suitable for data line)
EMIF02-MMC R1/R2/R3/R4=47R

UEME includes a 13k pullup between GEN28IO2 (command) and VAUX1
so EMIF02-MMC R10 is left unconnected. UEME has no pullup on GEN28IO3 (MMC data)



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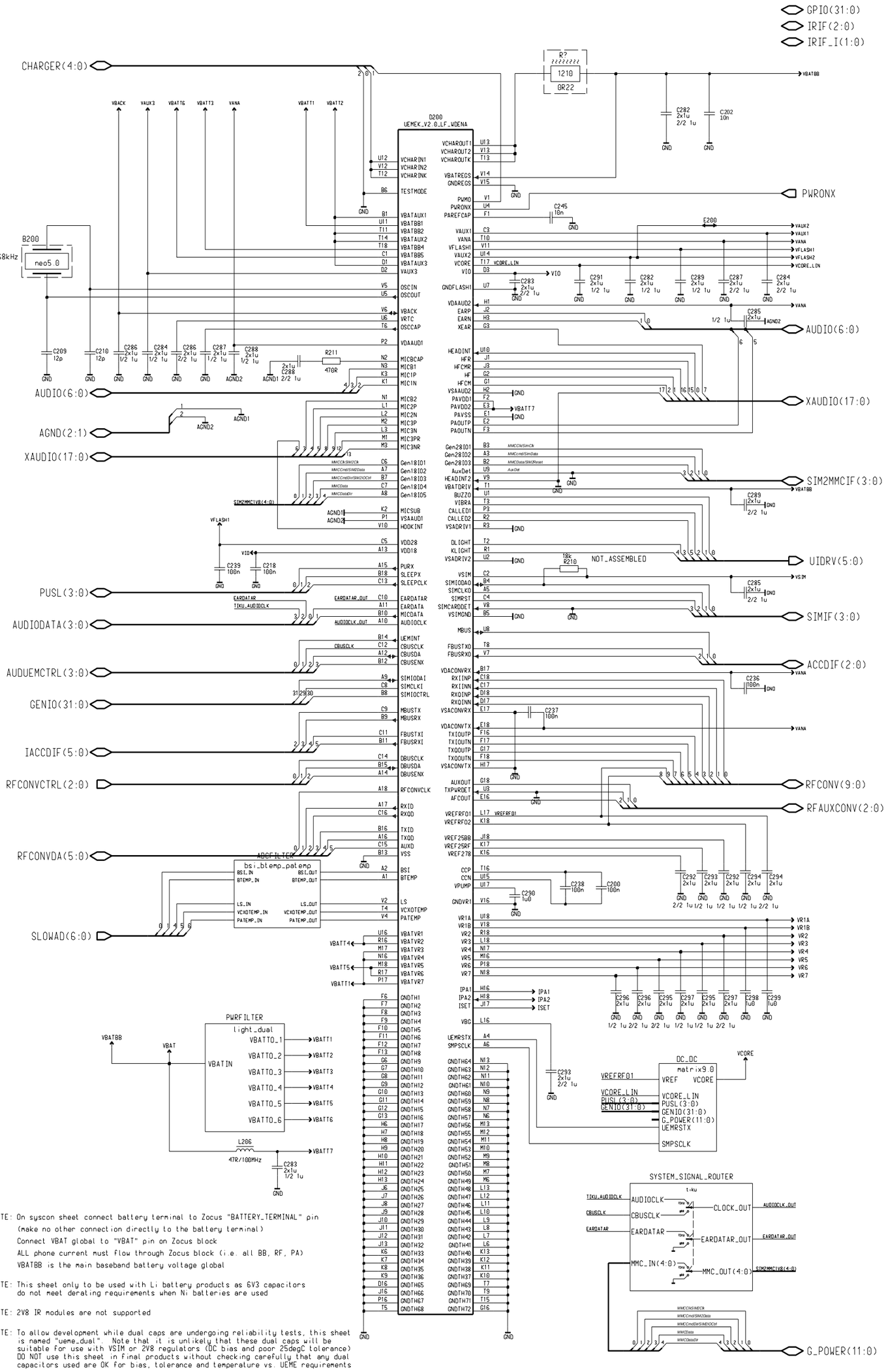

NOTE: On syscon sheet connect battery terminal to Zocus "BATTERY_TERMINAL" pin
(make no other connection directly to the battery terminal)
Connect VBAT global to "VBAT" pin on Zocus block
ALL phone current must flow through Zocus block (i.e. all BB, RF, PA)
VBATBB is the main baseband battery voltage global

NOTE: This sheet only to be used with Li battery products as 6V3 capacitors do not meet derating requirements when Ni batteries are used

NOTE: 2V8 IR modules are not supported

NOTE: To allow development while dual caps are undergoing reliability tests, this sheet is named "ueme_dual". Note that it is unlikely that these dual caps will be suitable for use with VSIM or 2V8 regulators (DC bias and poor 25degC tolerance) DO NOT use this sheet in final products without checking carefully that any dual capacitors used are OK for bias, tolerance and temperature vs. UEME requirements

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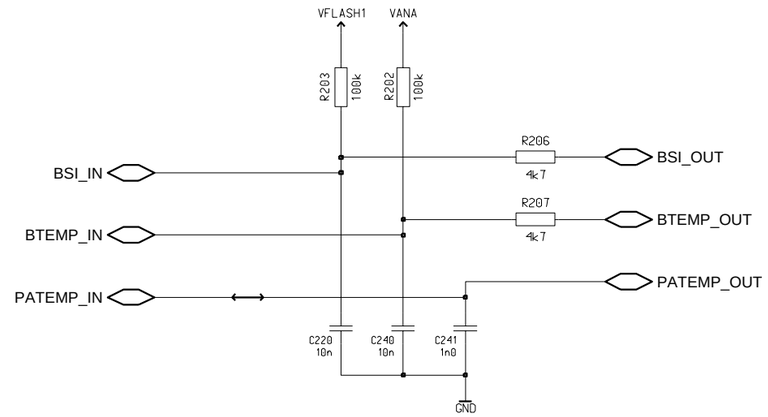
UEME ADC Filter Block - BSI, BTEMP and Active PATEMP, 1maa_02, v. 1.0



NOTE: Helga RF drives PATEMP directly
so PATEMP does not need a pullup

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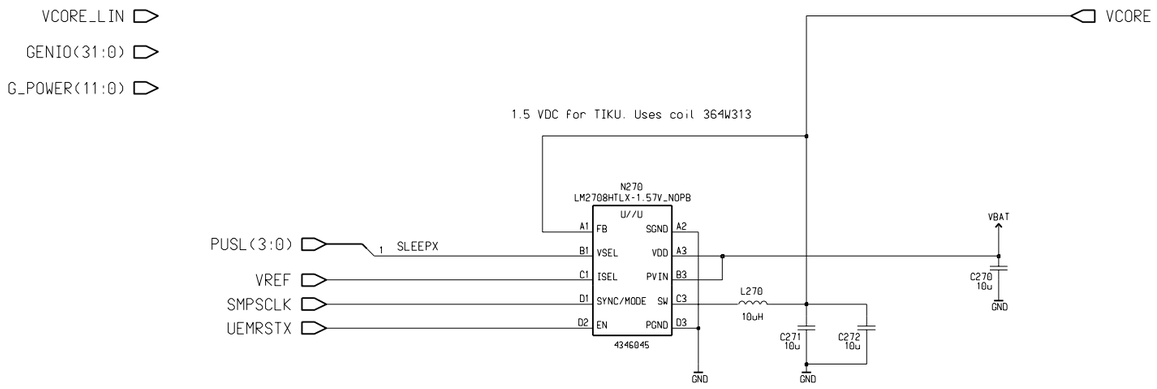
DC_DC for TIKU and VIO, 1maa_02, v. 1.7 ed. 79



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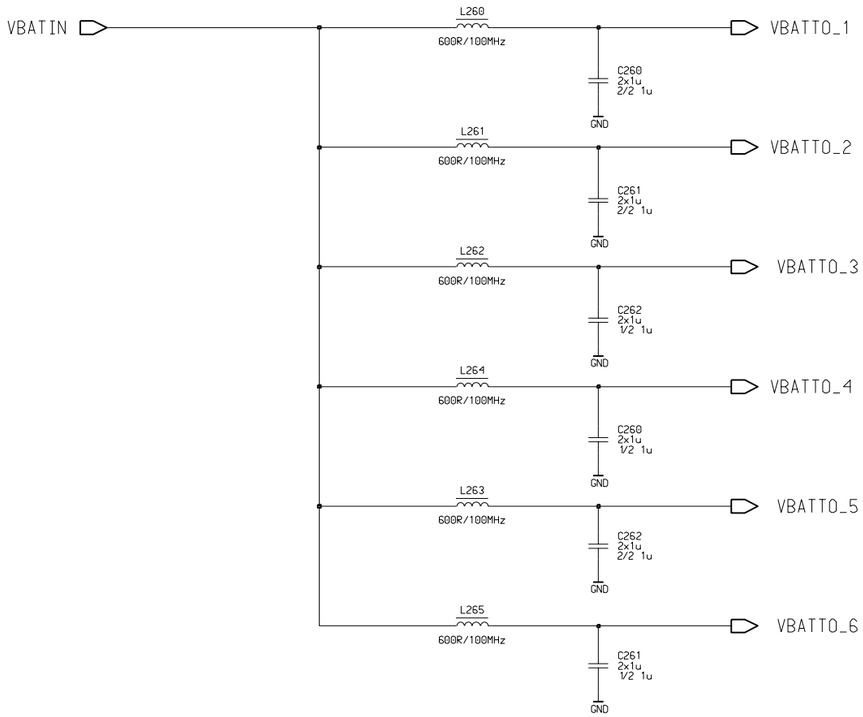
Light Filtering for Projects using 1uF Caps, 1maa_02, v. 1.0



NOTE: This sheet uses dual 1uF capacitors. Check that full approval has been granted for these parts before use, or use this sheet at risk

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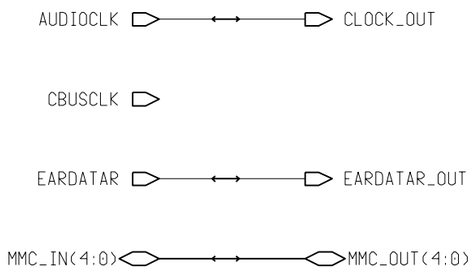
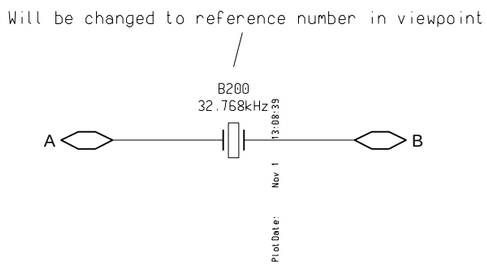
Tiku Systems, 1maa_02, v. 1.0



↗E916

32KHz Crystal- Micro Crystal CC4VT2, 1maa_02, v. 0 ed. 8



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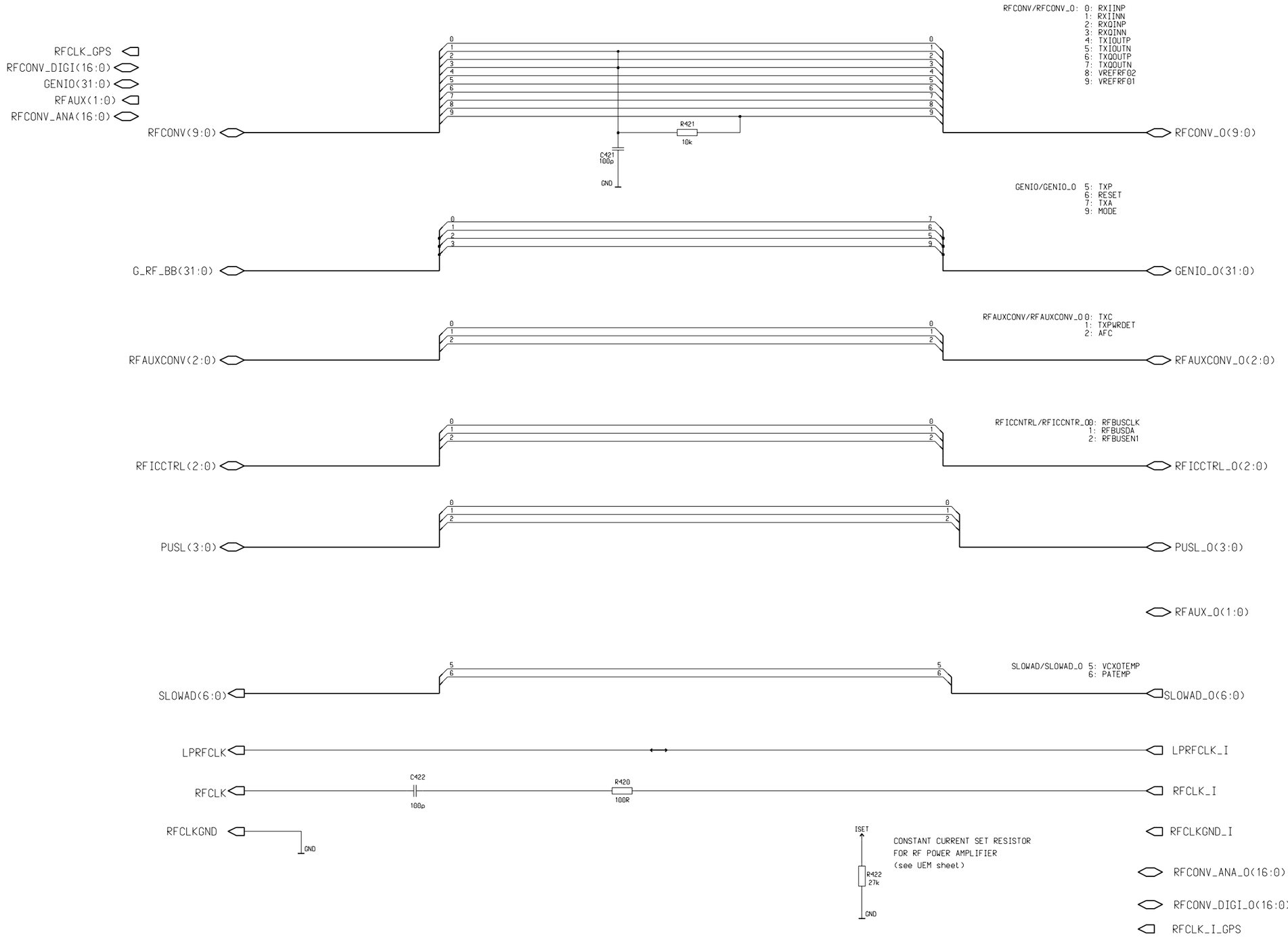
GSM RF - Baseband Interface, 1maa_02, v. 1.3 ed. 65



IPA1 AND IPA2 ARE USED IN RF, THE TOLERANCE OF R422 IS 1% (0402, 1430873)

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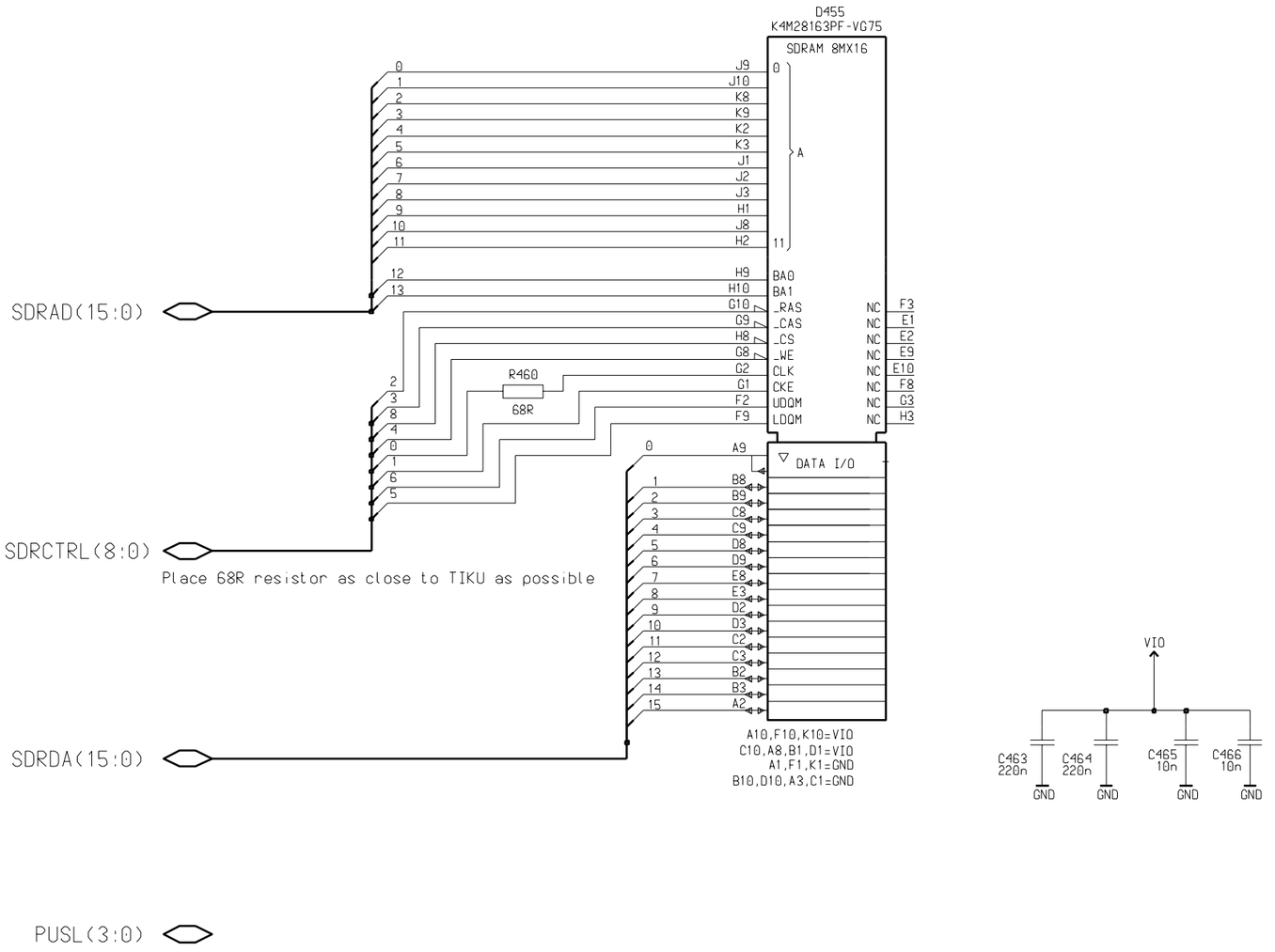
64Mbit 2V8 SDRAM Memory, 1maa_02, v. 1.0 ed. 68



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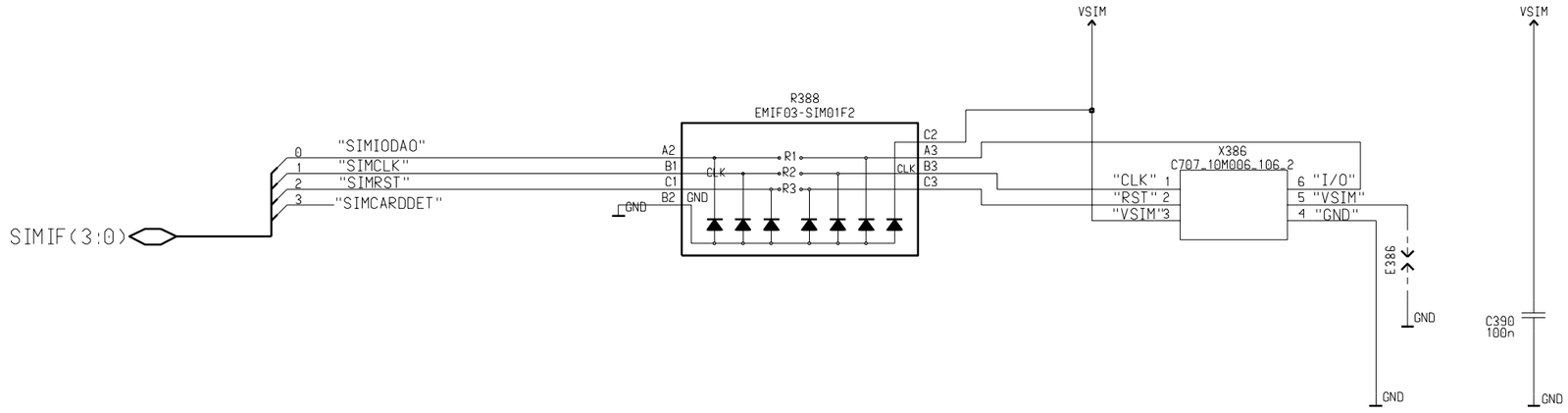
SIM Reader, 1maa_02, v. 1.3 ed. 67



GENIO(31:0)

SIM2MMCIF(3:0)

G_SIM(7:0)

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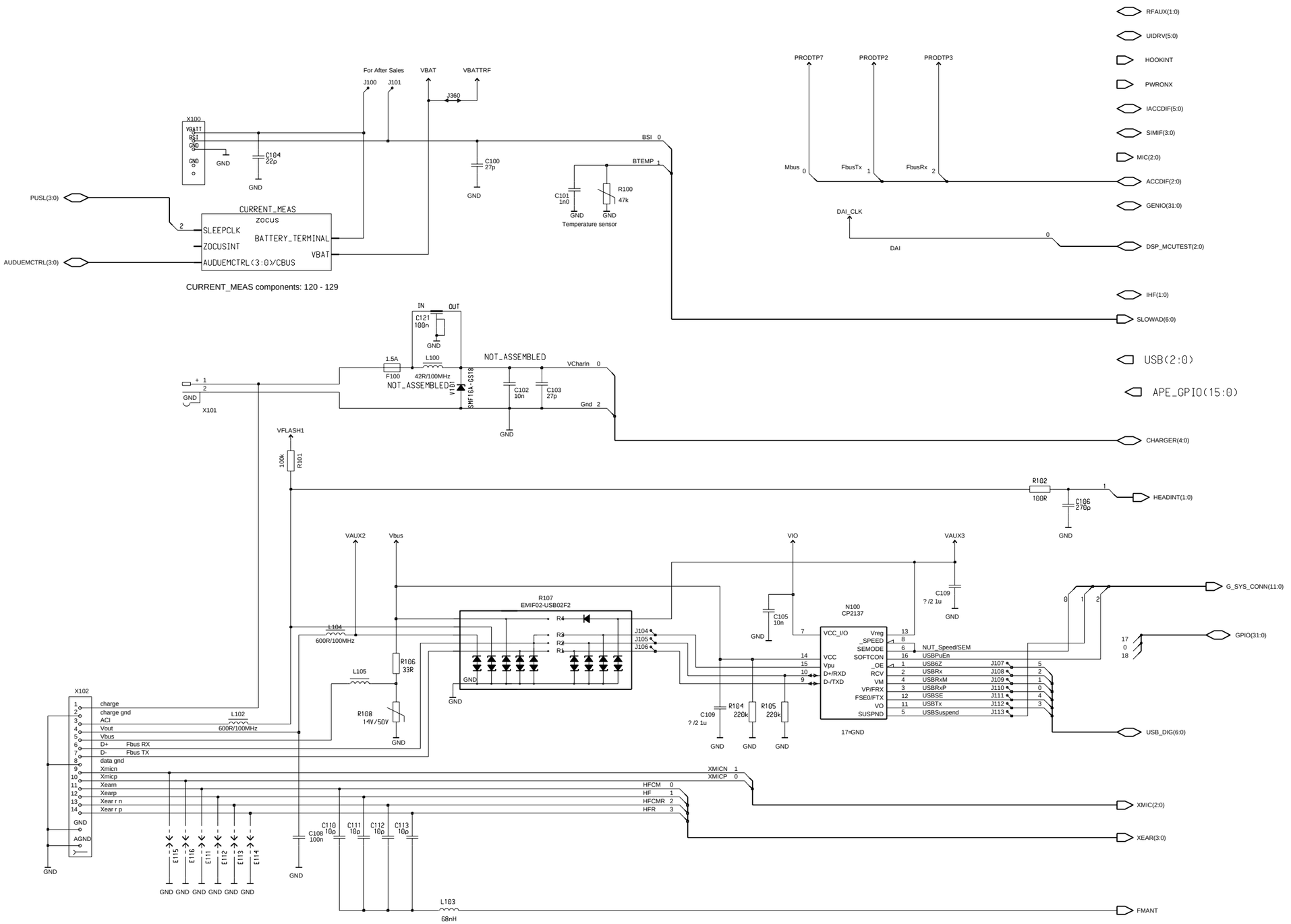
System Connector, 1maa_02, v. 0.0 ed. 204



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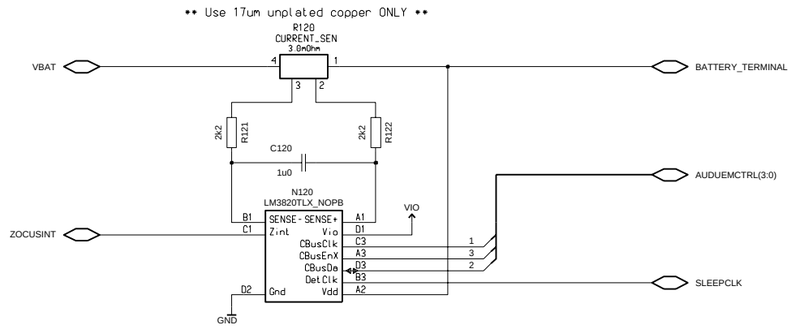
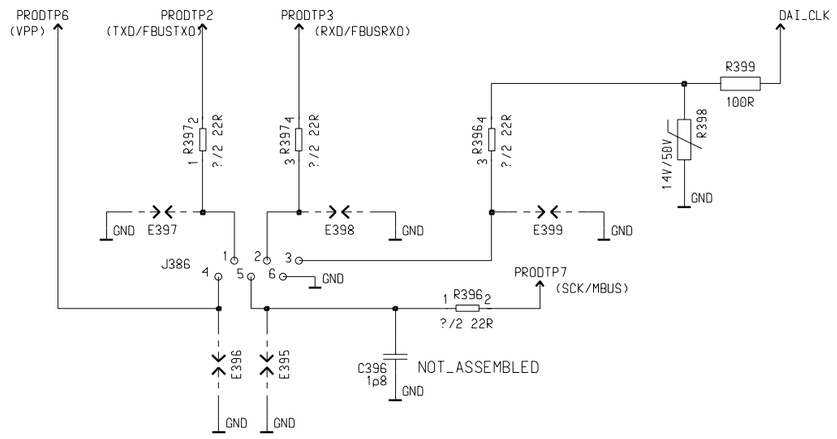
Current Measure, 1maa_02, v. 0 ed. 19



5 pin Test Pattern, 1maa_02, v. 2.0 ed. 53



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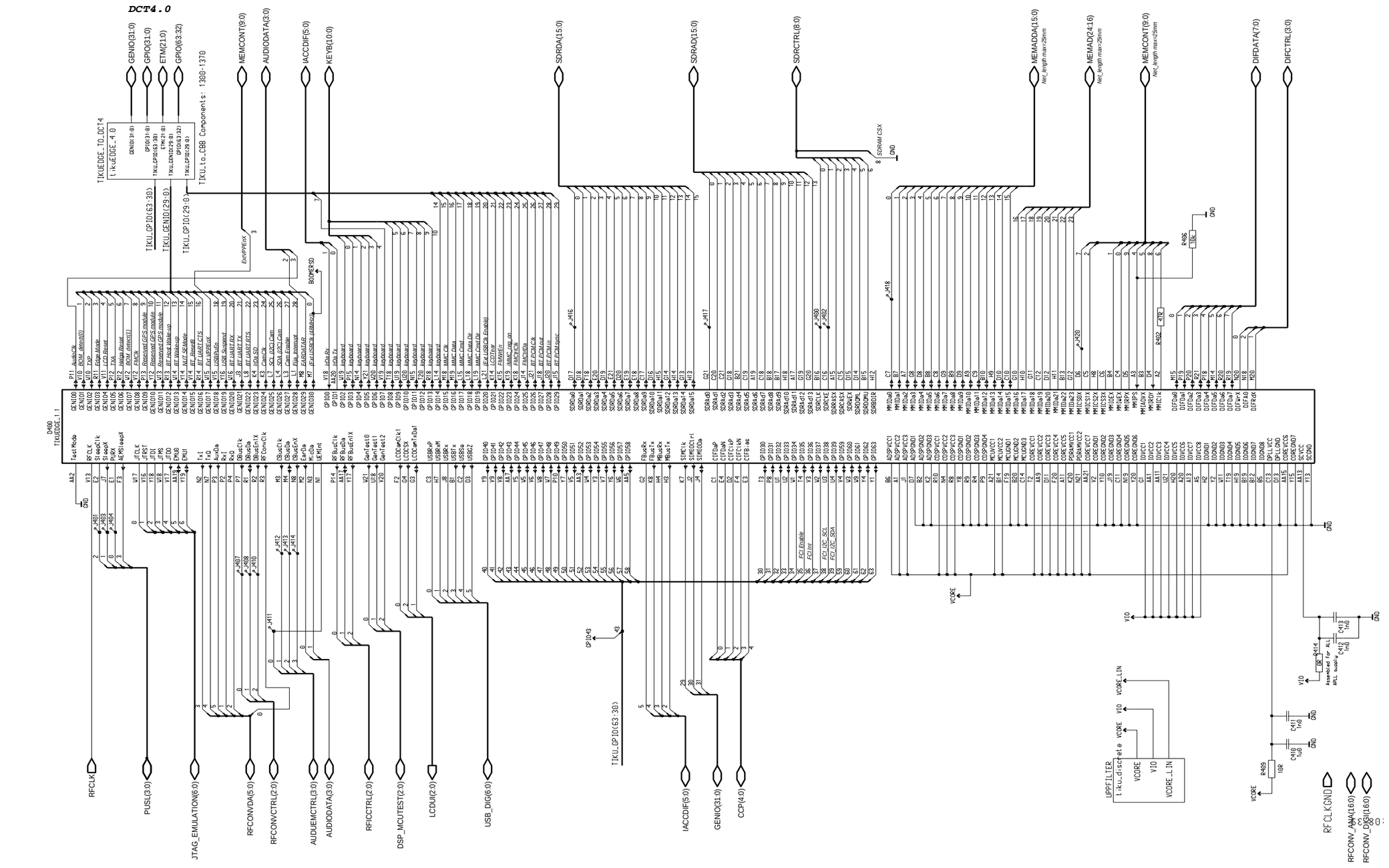
TIKUedge Implementation (GSM), 1maa_02, ed. 135



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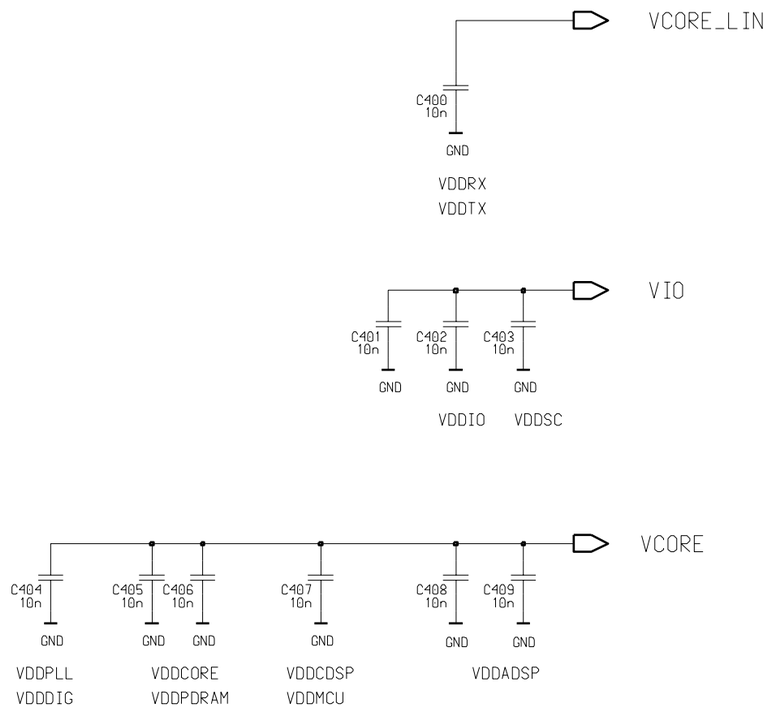
Discrete Decoupling Capacitors for Tiku, 1maa_02, v. 0 ed. 12



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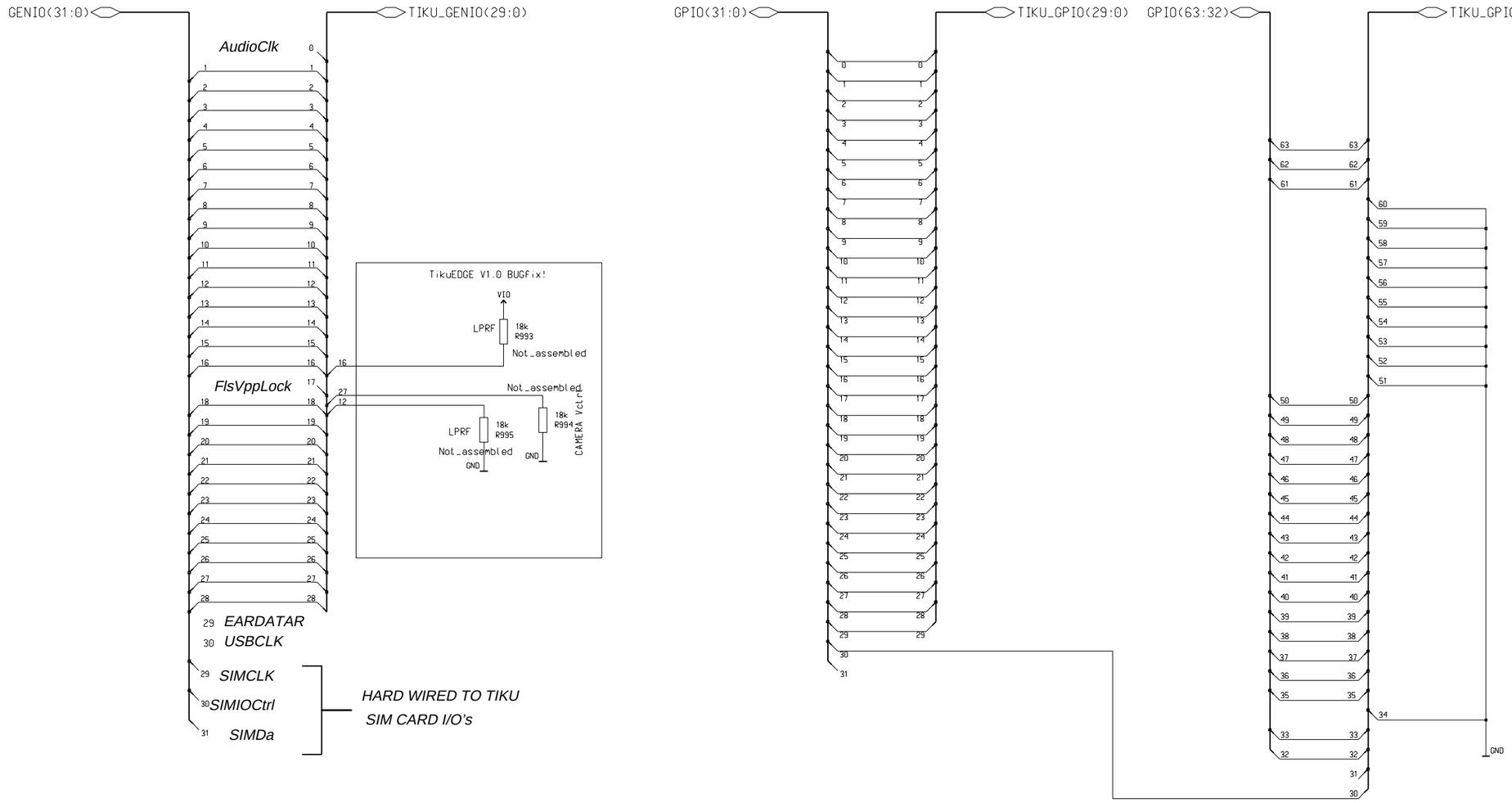
TikuEDGE Bus Conversion Sheet, 1maa_02, v. 1.2 ed. 104



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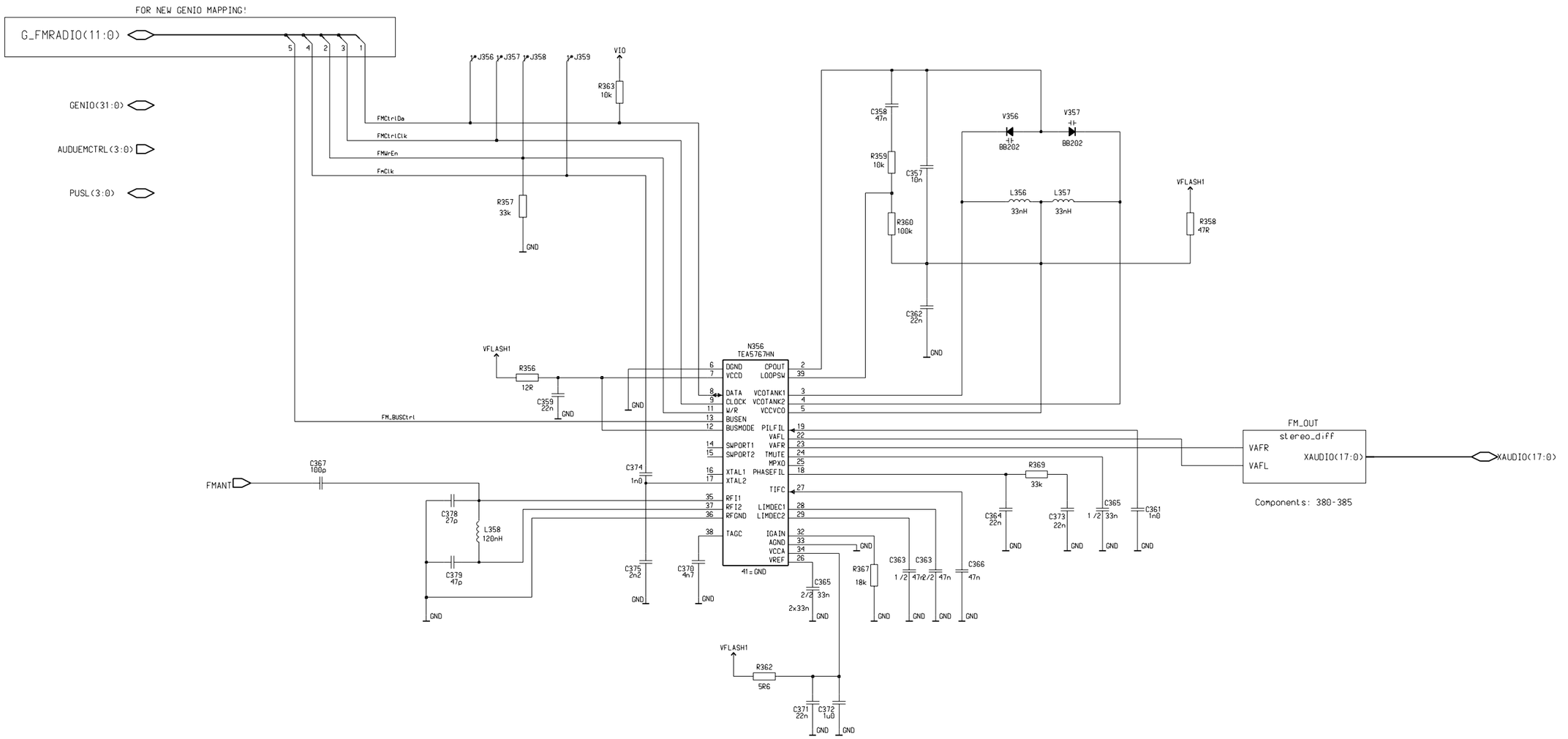
FM Radio Unit, 1maa_02, v. 1.3 ed. 199



Notice:

C374 (1n0) and C375 (2n2) are configured for 32kHz reference clock

If reference clock is 6.5MHz, use C374 (3p9) and C375 (10p)

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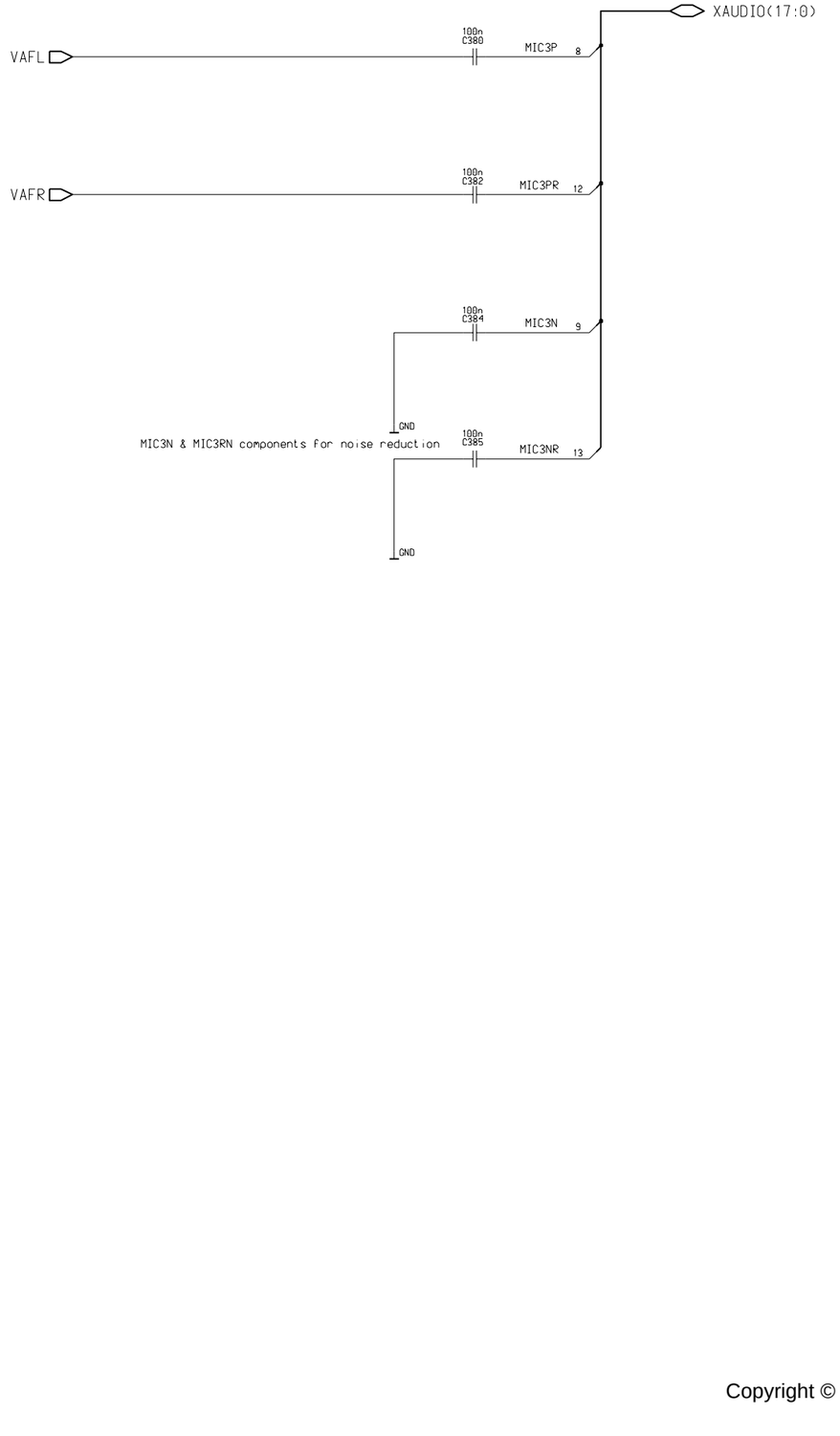
Differential Stereo, 1maa_02, v. 0.0 ed. 7



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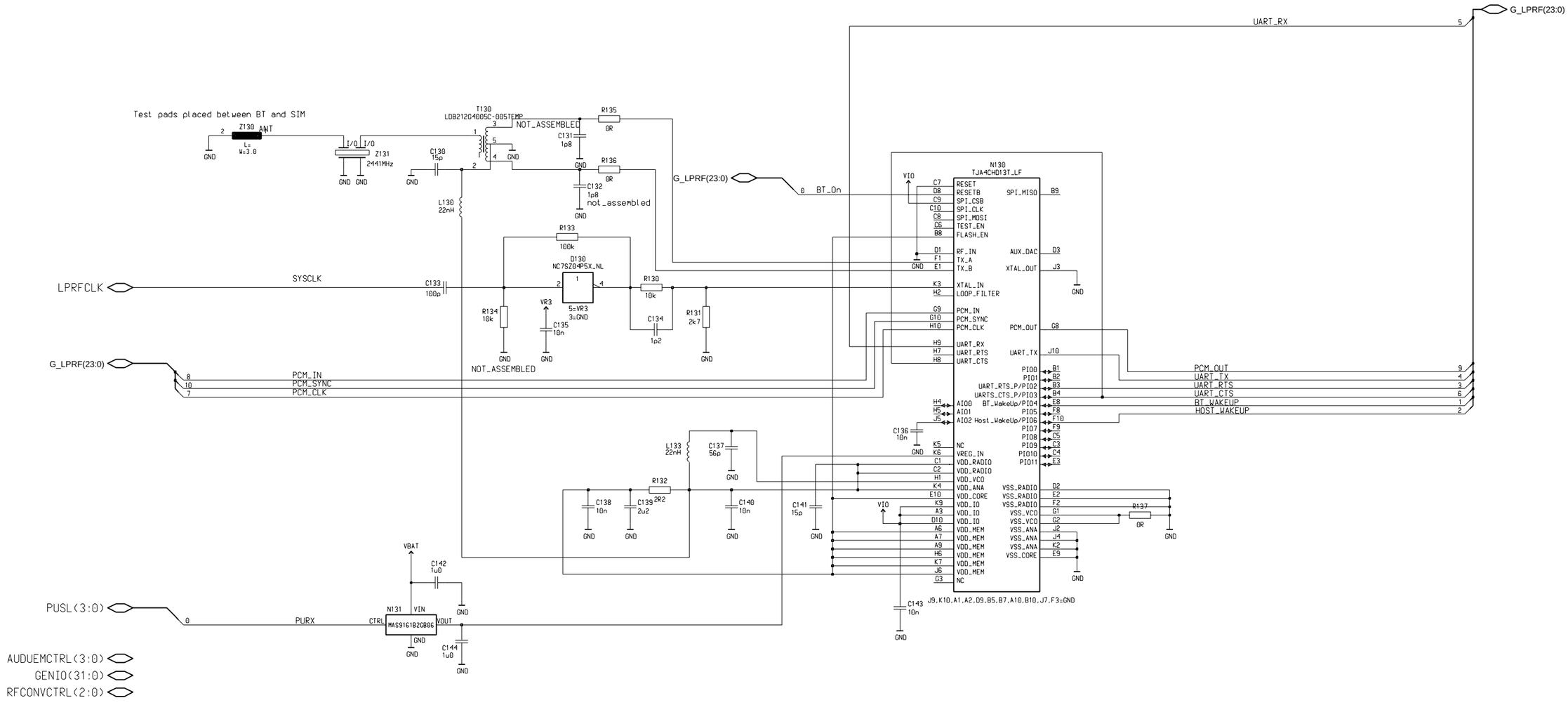
Low Power RF Module, 1maa_02, ed. 148



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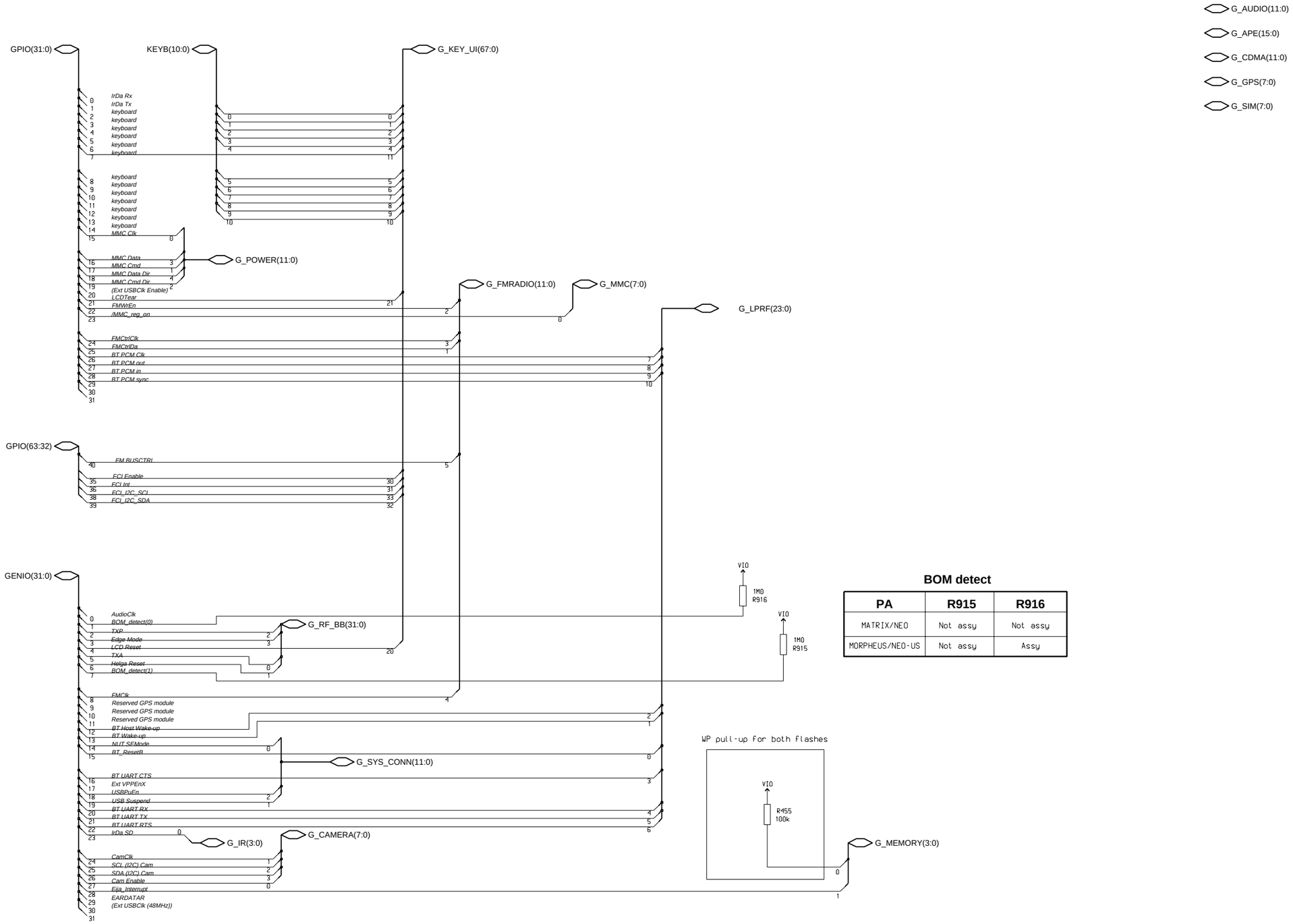
GENIO and GPIO Connection Block, 1maa_02, v. 0.0 ed. 42

TIKU GPIO & GENIO BUSES



BOM detect

PA	R915	R916
MATRIX/NEO	Not assy	Not assy
MORPHEUS/NEO-US	Not assy	Assy

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